

MEMORANDUM

DATE: August 31, 2020

TO: City of Maple Valley

FROM: Spenser Haynie
TENW

SUBJECT: Updated Transportation Impact Analysis for the proposed
Maple Valley Logistics – Maple Valley, WA
TENW Project No. 5993

This memorandum documents the updated Transportation Impact Analysis (TIA) prepared for the proposed Maple Valley Logistics project. This is an update to our previous TIA (dated July 21, 2020) and is intended to address comments received from the City dated August 5, 2020. The project site is located on SE 231st Street and Witte Road SE in the City of Maple Valley as shown on the site vicinity map (**Figure 1**).

This memo includes a project description, summary of existing conditions, project trip generation estimates, updated LOS analyses, updated site access evaluation, an estimate of City transportation impact fees, and proposed Traffic Management Plan (TMP) strategies.

The scope of the traffic analysis was confirmed with City staff in coordination with the City's transportation consultant (Transpo Group). Existing traffic counts, estimated traffic shifts with the City's planned SE 231st Street extension, and total pipeline peak hour traffic volumes were provided by the City's consultant.

Findings and Conclusions

Project Description. The proposed Maple Valley Logistics project located on the southeast corner of SE 231st Street and Witte Road SE would include a 112,104 square foot (SF) high-cube fulfillment center warehouse on a site that is currently vacant. Vehicular access to the Maple Valley Logistics project is proposed via two (2) new full access driveways on Witte Road SE and three (3) new full access driveways onto the planned SE 231st Street extension. Truck access would be provided at the proposed southeastern access on SE 231st Street. The anticipated buildout year for the proposed Maple Valley Logistics project is 2021.

Trip Generation. The Maple Valley Logistics project is estimated to generate 722 new weekday daily trips, with 98 new trips occurring during the weekday AM peak hour and 135 new trips occurring during the weekday PM peak hour.

Note that the trip generation estimates for the proposed Maple Valley Logistics project are based on anticipated operations for the majority of the year (approximately 11 months). Increased site activity and operations are expected during the peak holiday season (approximately 1 month of the year between Thanksgiving and Christmas) to accommodate the increased demand during holiday season. The weekday peak hour trip generation estimates during the peak holiday season could be approximately two to three times greater than during the off-peak season based on the tenant's historical experience.

Level of Service. All signalized and roundabout study intersections and individual movements at the stop controlled study intersection are anticipated to operate at acceptable levels (LOS D or better) in 2021 during the weekday AM and PM peak hours with the proposed project both without and with the City's planned SE 231st Street extension, with two exceptions. The SR-169 / Witte Road SE intersection is anticipated to operate at LOS E during the weekday PM peak hour with the proposed project without the City's planned SE 231st Street extension and LOS D with the planned extension. It should be noted that this intersection is anticipated to operate at LOS E in 2021 under baseline conditions without the proposed project. Additionally, the SR 169 / SE 240th Street intersection is anticipated to operate at LOS D during the weekday PM peak hour with the proposed project without the City's planned SE 231st Street extension and LOS E with the planned extension.

Note that while all of the signalized study intersections on SR-169 appear to be operating at acceptable levels from a delay standpoint under existing conditions, queues from each of these signals routinely extend beyond the existing storage lanes and pockets between the signalized intersections during the typical weekday PM peak period.

Site Access Evaluation.

Driveway Spacing: The City of Maple Valley requires a minimum of 18 feet between driveways serving the same parcel of land. Based on the current site plan, all proposed site access locations were verified to be at least 18 feet apart, meeting City requirements.

Sight Distance: Intersection and stopping sight distance were evaluated at both proposed site access locations on Witte Road SE using City of Maple Valley standards. The available intersection sight distances looking east and west from both proposed site access locations on Witte Road SE appear to meet AASHTO standards based on exhibits by provided by Barghausen. Note that the west access on Witte Road SE has been relocated to the west on Witte Road SE (away from the vertical curve) in order to meet the minimum AASHTO requirements. Based on field observations, there appears to be adequate stopping sight distance at both proposed site access locations on Witte Road SE. All proposed site access locations on the new SE 231st Street extension are expected to be constructed with adequate sight distance.

Turn Lane Evaluation: Based on WSDOT *Design Manual* guidelines, neither a dedicated right-turn or left-turn lane would be recommended at any of the proposed site access locations without or with the City's planned SE 231st Street extension based on the estimated future peak hour traffic volumes and anticipated operations.

Level of Service and Queuing: The individual movements at each of the proposed site access locations are anticipated to operate at acceptable levels (LOS B or better) with minimal queuing during the PM peak hour in 2021 without or with the City's planned SE 231st Street extension.

Mitigation.

Transportation Impact Fees: To mitigate long-term traffic impacts created by the proposed Maple Valley Logistics, the City of Maple Valley requires payment of a transportation impact fee to help fund city-wide transportation improvements. The City's currently adopted transportation impact fee rate is \$4,437 per new PM peak hour trip. The estimated transportation impact fee for the Maple Valley Logistics project is \$598,995 (\$4,437 X 135 new PM peak hour trips). Transportation impact

fees are due at the time of building permit issuance and impact fee rates are subject to change. The impact fee shall be based upon the schedule in effect at the time of issuance of the permit.

SE 231st Street: Construct and dedicate the portion of SE 231st Street located in Tract B of the Site Plan, and the Witte Road frontage improvements located within Lot 2 and Tract A. Since the City's Transportation Impact Fee (TIF) program includes the SE 231st Street Connection (Witte Road to SE 240th Street), the improvements are eligible for credit against the project traffic impact fee.

Traffic Management Plan (TMP): To mitigate the anticipated peak holiday season traffic and ensure there are no off-site parking issues, the following TMP strategies are identified:

1. Carpool/Vanpool Parking – provide designated carpool/vanpool parking stalls near building entrances.
2. Carpool and Vanpool Ride-Matching Services – tenant to designate an on-site operations manager as the employee contact responsible for matching potential carpool and vanpool drivers and riders via an application system.
3. Bicycle Parking – provide more on-site bicycle parking than required by code.
4. Passenger Loading Zones – a loading zone will be identified for carpool/vanpool drop offs near the front of the building.
5. Pedestrian Connections – designate pedestrian circulation within the site and extended to existing City sidewalks.
6. Direct Route to Transit – encourage City to request new transit stop at SR 169/Witte Road. (note: nearest existing stop is at SR-169/SE 240th Street approximately a half mile walk from the site)
7. Subsidize Transit Passes – offer on-site employees subsidized transit passes (i.e. Orca card).
8. Guaranteed Ride Home – make available to employees the existing King County Metro guaranteed ride home program.
9. Designated Employer Contact – the on-site operations manager name and phone number will be provided to the City at the time it is known. The manager will be the primary contact for carpool and vanpool matching, and on-site communications related to auto-reduction measures.
10. Informational Kiosk – the on-site manager will display the following information in a prominent location including: transit routes, carpool and vanpool information. This information can also be housed within the tenant's internal intranet pages.
11. Promotional Items – the informational kiosk will contain the following items: a new employee packet with transit information, rideshare options.
12. Annual Survey – commute surveys will be conducted bi-annually consistent with the WA CTR program



Figure 1: Project Site Vicinity



Project Description

The proposed Maple Valley Logistics project is located on SE 231st Street and Witte Road SE in the City of Maple Valley. The proposed development would include a 112,104 square foot (SF) high-cube fulfillment center warehouse on a site that is currently vacant. Vehicular access to the Maple Valley Logistics project is proposed via two (2) new full access driveways on Witte Road SE and three (3) new full access driveways onto the planned SE 231st Street extension (see **Figure 2** Site Plan). Truck access would be provided at the proposed southeastern access on SE 231st Street. The anticipated buildout year for the proposed Maple Valley Logistics project is 2021.

Existing Conditions

Roadway Network

The primary travel routes to and from the site include Witte Road SE, SE 231st Street, and SR-169. The relationship of these roadways to the project site can be seen previously in **Figure 1**.

Witte Road SE is a two-way northeast-southwest 2-lane collector along the project frontage. The posted speed limit on Witte Road SE in the project vicinity is 35 mph.

SE 231st Street is a two-way northwest-southeast 2-lane collector near the project frontage which connects perpendicularly to Witte Road SE. Intermittent sidewalks exist on the west side of the street and shoulders exist on both sides of the street. The posted speed limit on SE 231st Street in the project vicinity is 35 mph.

SR-169 is a two-way north-south 4-5-lane principal arterial in the project vicinity. Sidewalks exist on the west side and marked crosswalks with pedestrian pushbuttons are located at signalized intersections. The posted speed limit on SR-169 in the project vicinity is 35 mph.

Pedestrian Facilities

Pedestrian facilities in the immediate project vicinity include intermittent sidewalks on the west side of SE 231st Street. Marked crosswalks and pedestrian pushbuttons exist at the signalized study intersections in the area.

Transit Service

Transit service to and from the project site is served by King County Metro. The closest existing transit stops are located on SR 169 near SE 231st Street, which is approximately 0.3 miles northwest of the site, and provides access to route 907.

DART Route 907 offers weekday service between Black Diamond and the Renton Transit Center. Weekday service to the Renton Transit Center runs between 8:00 a.m. and 5:30 p.m. with approximate 60-minute headways. Weekday service to Black Diamond runs between 8:45 a.m. and 4:30 p.m. with approximate 60-minute headways.



Figure 2: Preliminary Site Plan



Collision History

Historic collisions at the study intersections were analyzed for the five-year period from 2015 to 2019. Collision data was provided by WSDOT. Summaries of the total and yearly average collisions at the study intersections during this time period are provided in **Table 1**. Summaries of the 5-year collision history at road segments in the study area are provided in **Table 2**.

Table 1
5-Year Collision Data Summary at Study Intersections

Intersection	5-Year Total Collisions			Average Annual Collisions		
	Total	Personal Injury	Property Damage Only	Total	Personal Injury	Property Damage Only
1. SR-169 / SE 231 st St	11	7	4	2.20	0.80	1.40
2. SR-169 / SE Wax Rd	47	14	33	9.40	2.80	6.60
3. SR-169 / Witte Road SE	23	8	15	4.60	1.60	3.00
4. SR-169 / SE 240 th St	33	11	22	6.60	2.20	4.40
5. Witte Rd SE / SE 231 st St	0	0	0	0.00	0.00	0.00
6. SE 240 th St / 228 th Ave SE	0	0	0	0.00	0.00	0.00

Source: WSDOT Collision Records (1/1/15 – 12/31/19).

Table 2
5-Year Collision Data Summary at Road Segments

Midblock Sections	5-Year Total Collisions			Average Annual Collisions		
	Total	Personal Injury	Property Damage Only	Total	Personal Injury	Property Damage Only
Witte Road SE between						
SR-169 and 230 th Pl	0	0	0	0.00	0.00	0.00
SR-169 between						
SE 240 th St and Witte Rd SE	35	15	20	7.00	3.00	4.00
Witte Rd SE and SE Wax Rd	0	0	0	0.00	0.00	0.00
SE Wax Rd and SE 231 st St	1	0	1	0.20	0.00	0.20
SE 240th Street between						
SR-169 and 228 th Ave SE	0	0	0	0.00	0.00	0.00

Source: WSDOT Collision Records (1/1/15 – 12/31/19).

Trip Generation

The weekday daily, AM peak hour, and PM peak hour trip generation estimates for the Maple Valley Logistics development were based on methodology documented in the Institute of Transportation Engineers (ITE) *Trip Generation Manual* 10th Edition Supplement (2020) for Land Use Code (LUC) 155 (High-Cube Fulfillment Center Warehouse - Sort). **Table 3** summarizes the resulting new weekday daily, AM peak hour, and PM peak hour trip generation estimates. Detailed trip generation calculations are included in **Attachment A**.

Table 3
Project Trip Generation Summary

Time Period	Passenger Vehicle Trips			Truck Trips			Total Trip Generation		
	In	Out	Total	In	Out	Total	In	Out	Total
Daily	351	350	701	10	11	21	361	361	722
AM Peak Hour	78	18	96	1	1	2	79	19	98
PM Peak Hour	52	81	133	1	1	2	53	82	135

As shown in **Table 3**, the Maple Valley Logistics project is estimated to generate 722 new weekday daily trips, with 98 new trips occurring during the weekday AM peak hour (79 in, 19 out), and 135 new trips occurring during the weekday PM peak hour (53 in, 82 out).

Note that the trip generation estimates for the proposed Maple Valley Logistics project are based on anticipated operations for the majority of the year (approximately 11 months). Increased site activity and operations are expected during the peak holiday season (approximately 1 month of the year between Thanksgiving and Christmas) to accommodate the increased demand during holiday season. The weekday peak hour trip generation estimates during the peak holiday season could be approximately two to three times greater than during the off-peak season based on the tenant's historical experience.

Trip Distribution and Assignment

The distribution of project generated traffic was based on recent turning movement counts in the area, comments from the City, as well as review of the distribution of deliveries to zip codes in the area. Project trips were generally distributed to the adjacent street network as follows:

- 35 percent to/from the south on SR-169
- 20 percent to/from the west on SE 231st Street
- 15 percent to/from the west on Witte Road SE
- 10 percent to/from the north on SR-169
- 10 percent to/from the southwest on SE Wax Road
- 5 percent to/from the west on SE 240th Street
- 5 percent to/from the east on SE 240th Street

For the purposes of this analysis, two future with-project scenarios were evaluated; both without and with the City's planned SE 231st Street extension.

Figures 3 and 4 provide a graphic illustration of the distribution and assignment of the new weekday peak hour project trips at the study intersections and proposed site access driveway locations for both without and with the City's planned SE 231st Street extension.

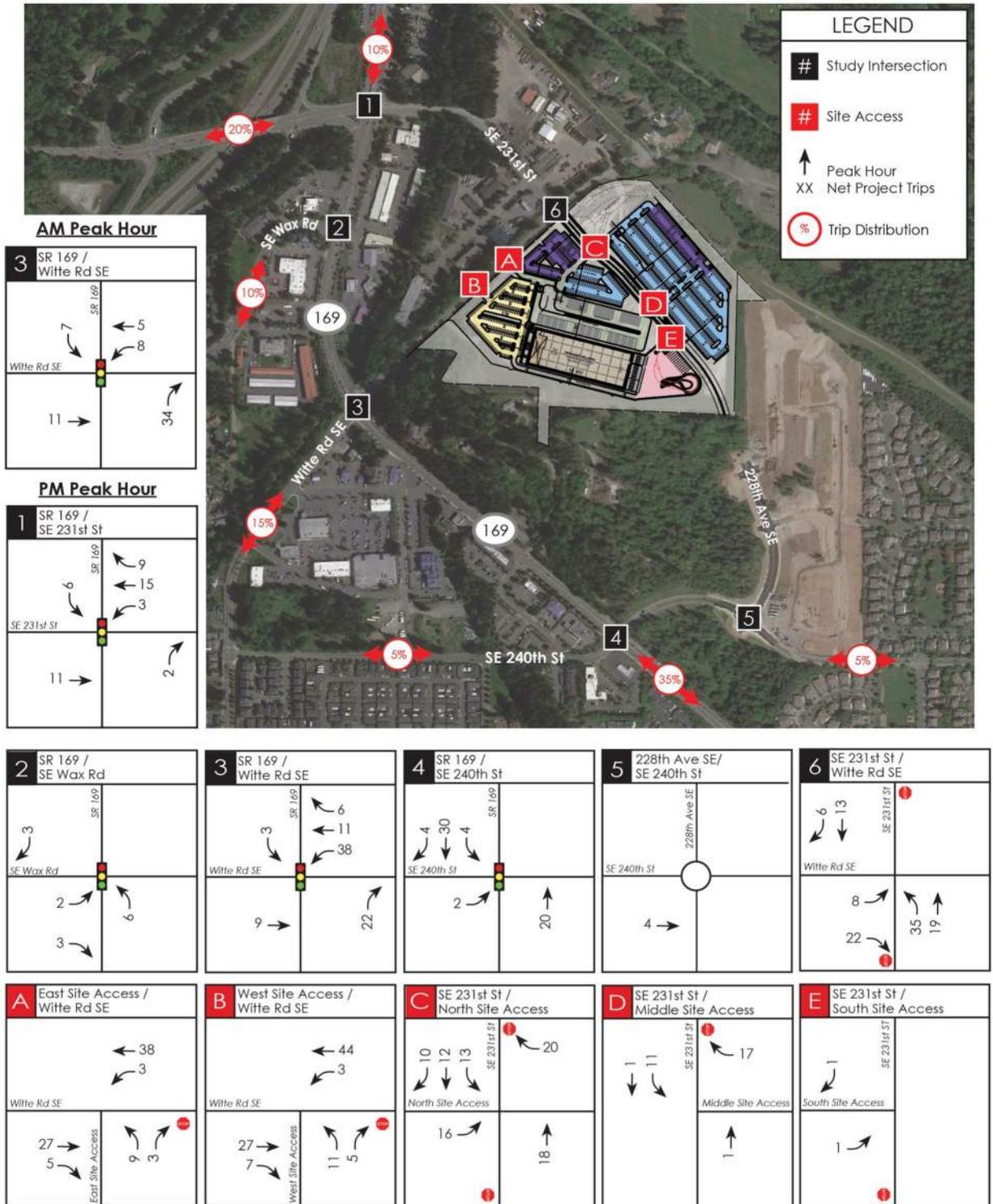


Figure 3: Weekday Peak Hour Trip Distribution and Assignment
(Without SE 231st St Extension)



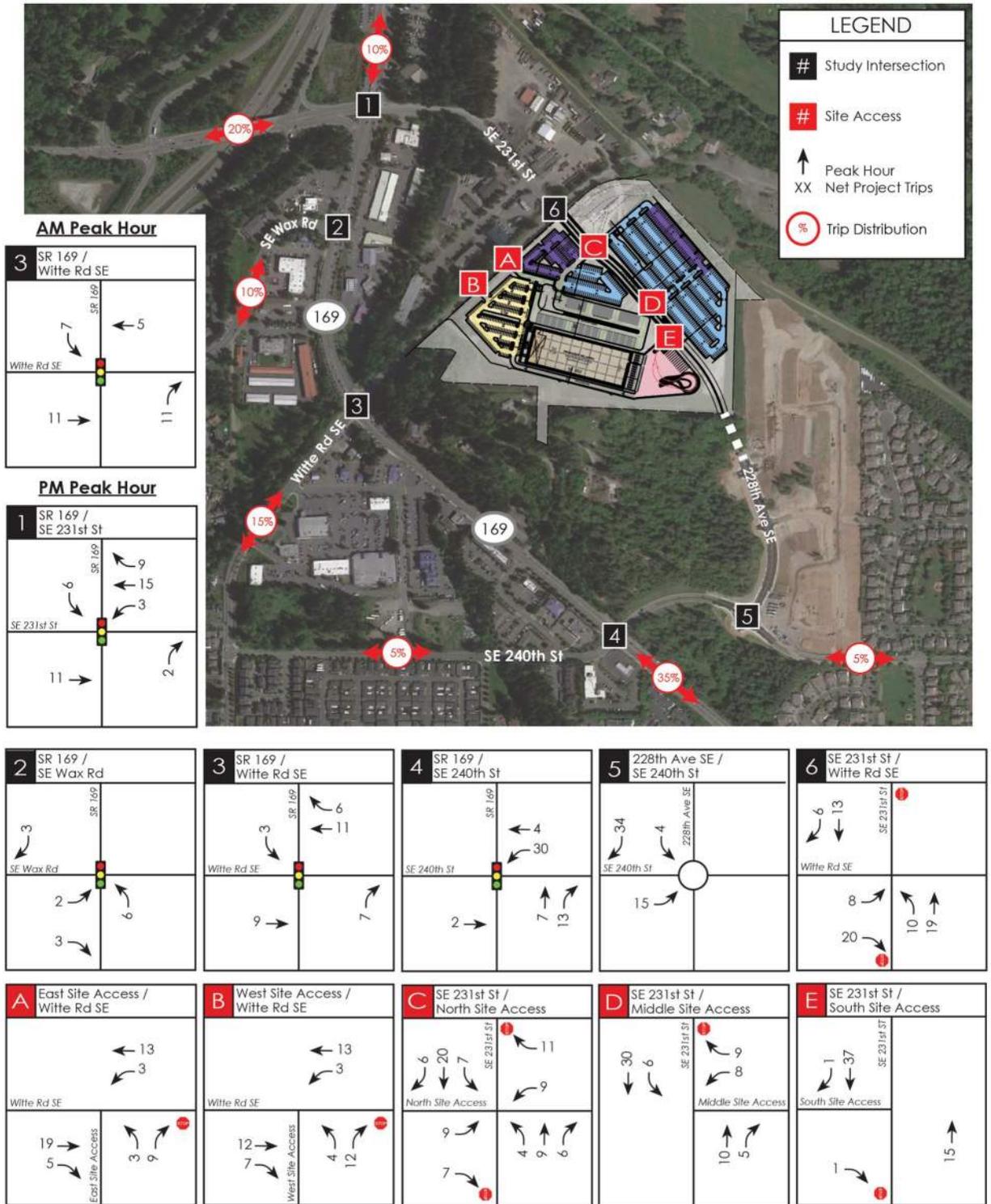


Figure 4: Weekday Peak Hour Trip Distribution and Assignment (With SE 231st St Extension)



NOT TO SCALE

Planned Transportation Improvements

This section documents the known transportation improvements planned by the City in the study area. Planned transportation improvement projects identified in the City of Maple Valley's adopted 2021-2026 *Transportation Improvement Program* (TIP) are included below:

- **Project T-48 – SE 231st Street Extension**

Description: This project will create an arterial connection through the former Hayes Gravel pit, slated for industrial development, providing a direct access to the SR 18 interchange. This arterial connection will provide one lane in each direction with a center lane in the industrial area, including sidewalks, bicycle lanes, and street lighting. The total project cost is \$5.8 million, and construction is expected to begin in 2021.

- **Project T-36 – SR-169 Widening – 2 (SE 240th Street to SE 244th Street)**

Description: The second segment in the series of capacity improvements on the SR-169 corridor, this project adds an additional lane in both directions and will also include center turn-lanes, sidewalks, bicycle lanes, improved transit stops, street lighting, and enhanced storm drainage. The total project cost is \$9.7 million, and construction is expected to begin in 2024.

- **Project T-27a – Curbed Walkway Improvements (SE Wax Road west of SR-169)**

Description: To bridge gaps between existing pedestrian facilities and limit locations where pedestrians must use the roadway, asphalt pathways will be constructed within the existing right of way. In some of these locations, an existing wide roadway shoulder will be repurposed as the walkway, narrowing vehicle lanes, with concrete curbing, painted white and enhanced with vertical markers for visibility, will provide a physical barrier between the walkway and travel lanes. Some locations may require widening of the shoulder or paving of currently unpaved paths to provide the pedestrian connection. The project provides for separated walkways in various locations in the City. Construction is expected to begin between 2021-2026.

Traffic Volume Forecasts

Existing weekday peak hour traffic volumes at the study intersections were provided by Transpo (the City's transportation consultant) in July 2020. **Figure 5** illustrates the 2020 existing weekday peak hour traffic volumes at the study intersections.

Future year 2021 without project peak hour traffic volumes were based on existing 2020 peak hour traffic volumes increased by one percent annually and combined with additional peak hour traffic generated by pipeline projects (known approved development) in the area. The additional pipeline traffic was provided by Transpo (the City's transportation consultant). The resulting future 2021 without project peak hour traffic volumes at the study intersections are shown in **Figure 6**. Future year 2021 with project peak hour traffic volumes were estimated for two scenarios; both without and with the City's planned SE 231st Street extension which would provide a new connection between SE 231st Street at Witte Road SE to 228th Avenue SE to the south. The existing weekday peak hour traffic volumes, peak hour traffic shifts expected with the City's planned SE 231st Street extension, and total pipeline peak hour traffic volumes are included in **Attachment C**. The 2021 with project traffic volumes were estimated by adding the trip assignment from the proposed Maple Valley Logistics project (shown in **Figures 3 and 4**) to the future 2021 without project traffic volumes (shown in **Figure 6**). The resulting future 2021 with project peak hour traffic volumes at the study intersections and proposed site driveways are shown in **Figures 7 and 8**.

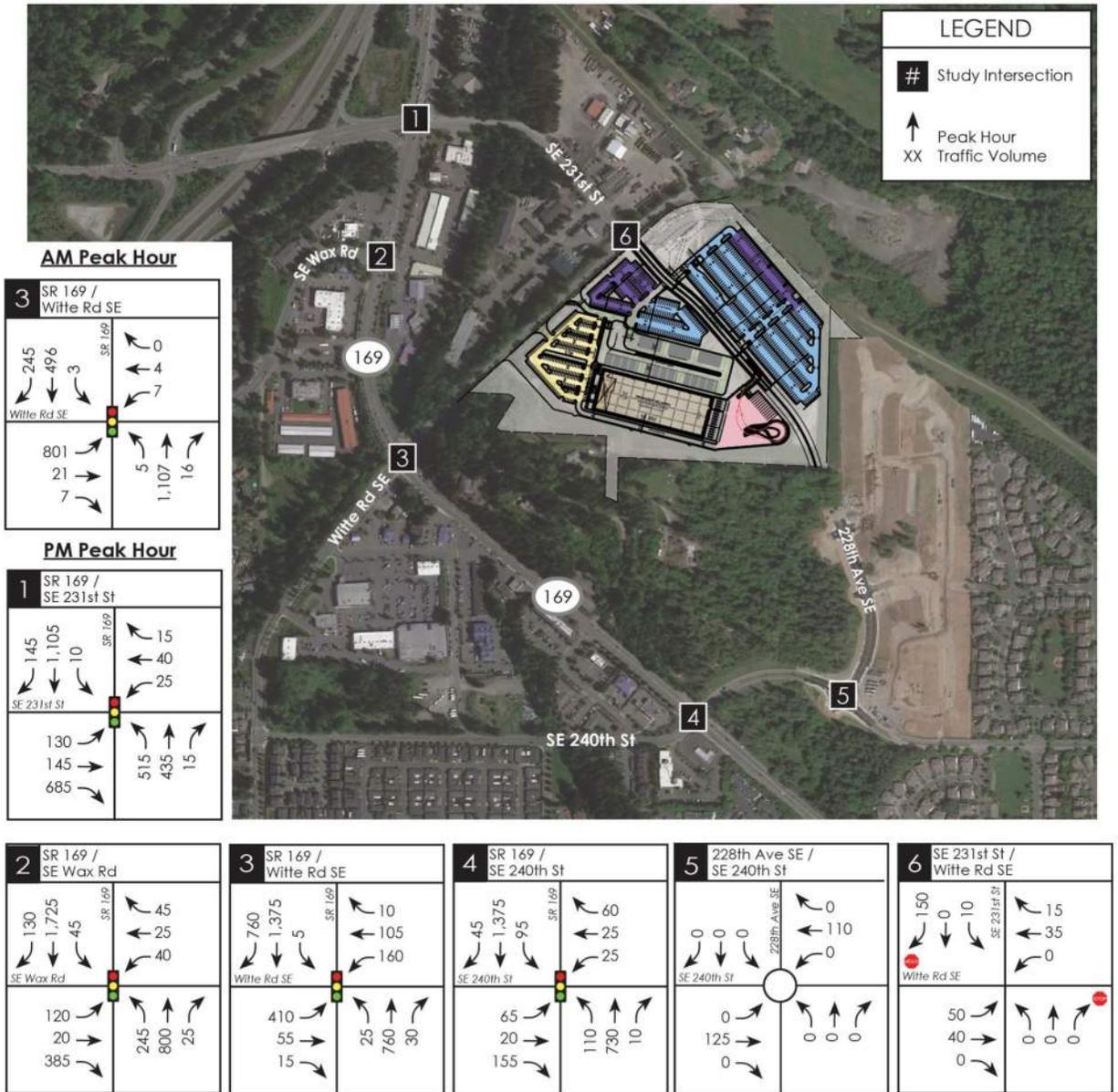


Figure 5: 2020 Existing Weekday Peak Hour Traffic Volumes



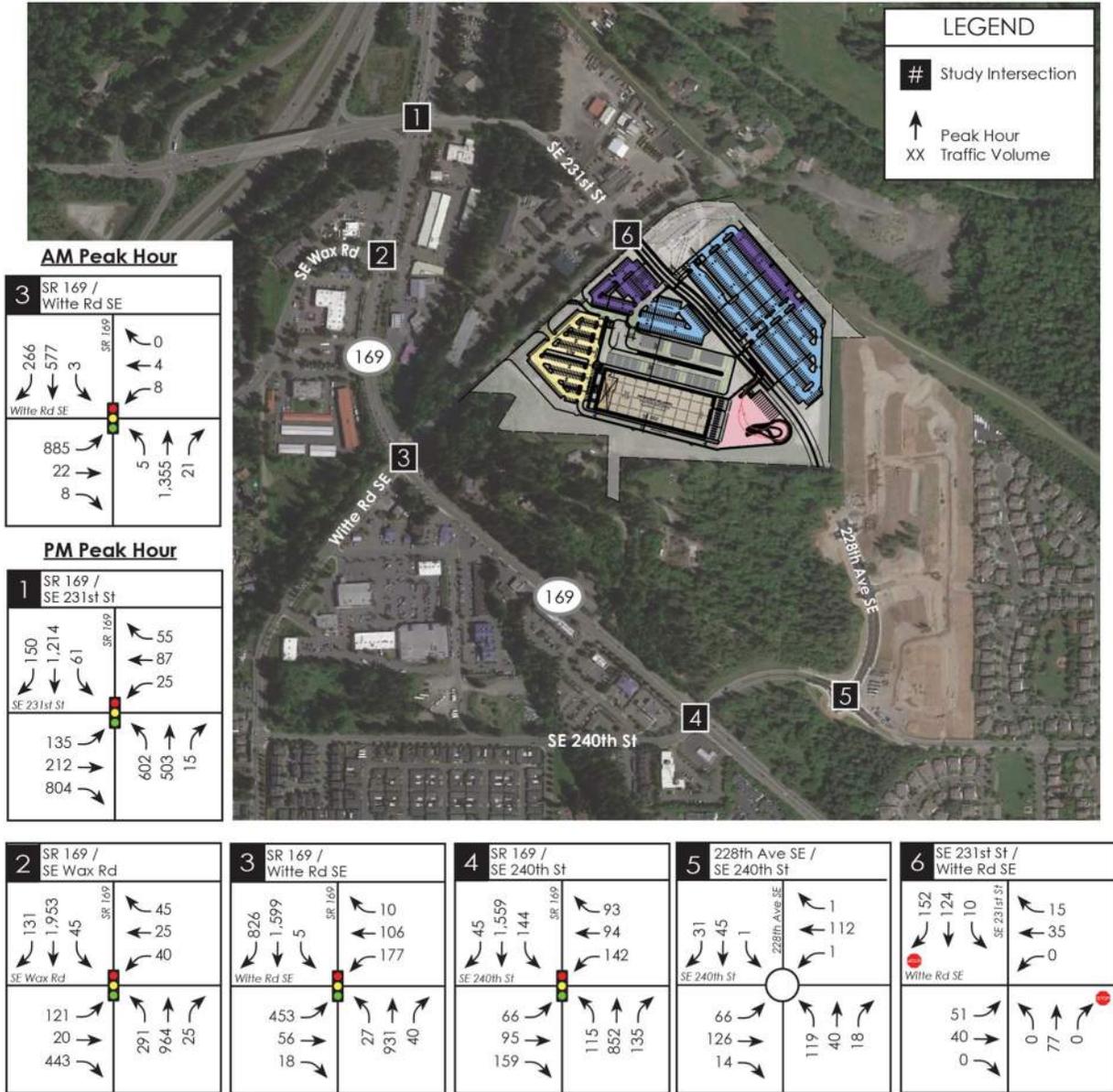


Figure 6: 2021 Without Project Weekday Peak Hour Traffic Volumes



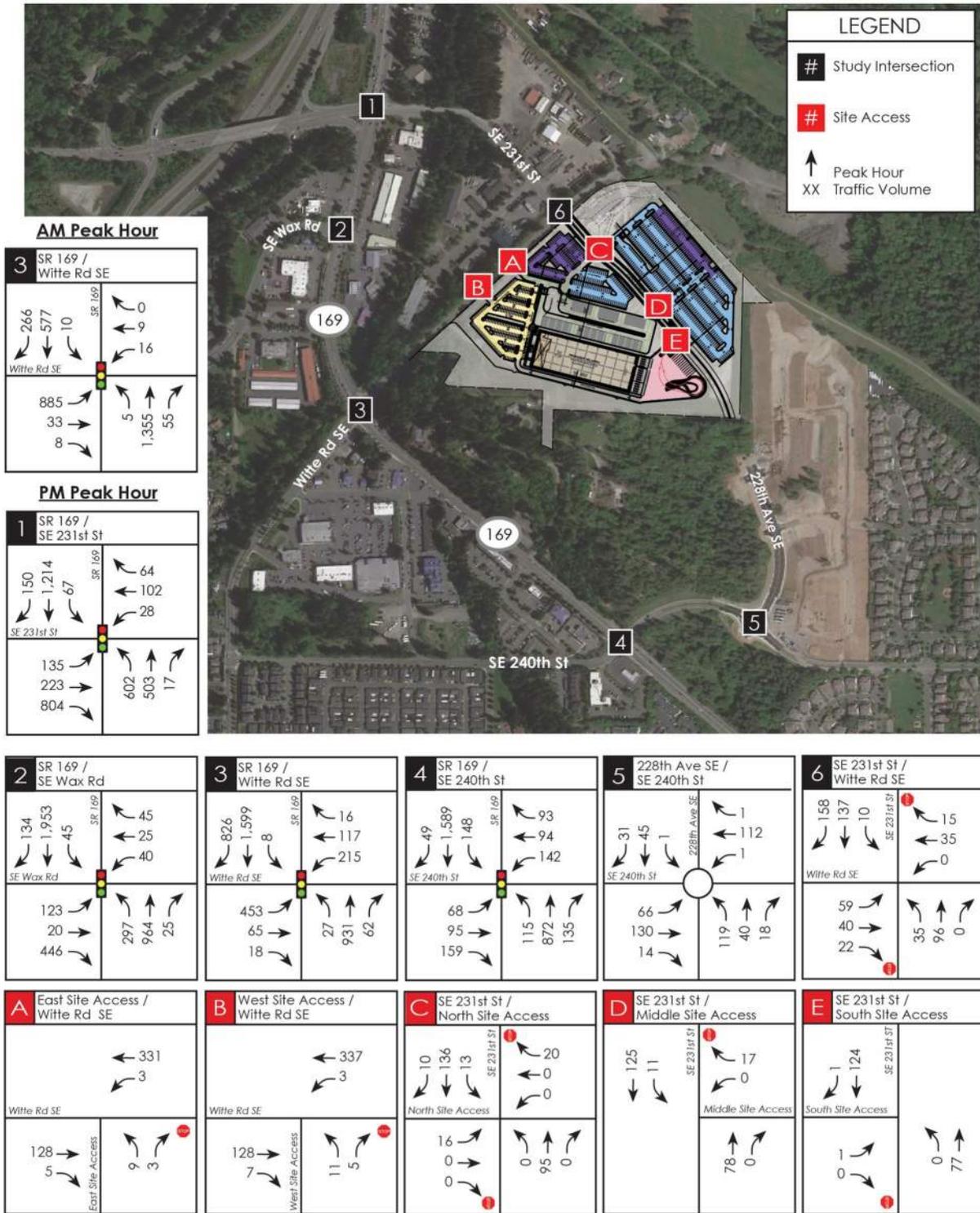


Figure 7: 2021 With Project Weekday Peak Hour Traffic Volumes
(Without SE 231st St Extension)



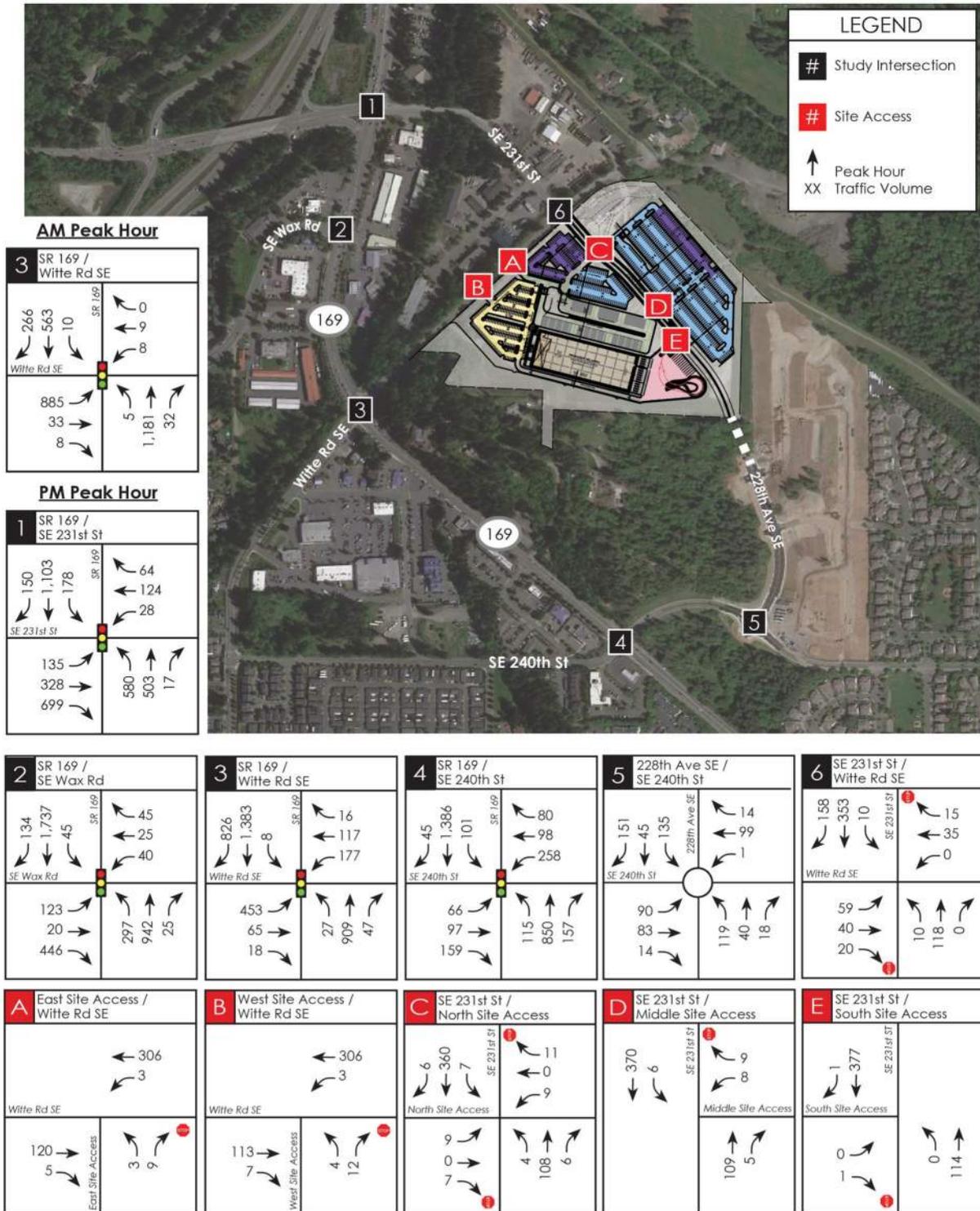


Figure 8: 2021 With Project Weekday Peak Hour Traffic Volumes (With SE 231st St Extension)



Level of Service Analysis

Weekday peak hour level of service (LOS) analyses were conducted at the following study intersections based on methodologies and procedures outlined in the latest *Highway Capacity Manual* (6th Edition):

1. SR-169 / SE 231st Street (PM only)
2. SR-169 / SE Wax Road (PM only)
3. SR-169 / Witte Road SE (AM and PM)
4. SR-169 / SE 240th Street (PM only)
5. SE 240th Street / 228th Avenue SE (PM only)
6. Witte Road SE / SE 231st Street (PM only)

The LOS analyses were conducted for four scenarios: 2020 existing, future 2021 without project, future 2021 with project (without SE 231st Street extension), and future 2021 with project (with SE 231st Street extension). The LOS methodology is described in **Attachment C**. The *Synchro Version 10* software package was used to determine LOS results. **Tables 4** summarizes the weekday PM peak hour LOS analysis results at the study intersections. Detailed LOS calculation sheets are included in **Attachment C**.

Table 4
Maple Valley Logistics LOS Summary

Study Intersection/Movement	2020 Existing		2021 Without Project		2021 With Project (w/o SE 231 st St extension)		2021 With Project (w/ SE 231 st St extension)	
	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
AM Peak Hour								
<u>Signalized Intersections</u>								
3. SR 169 / Witte Road SE	C	34.2	D	36.5	D	37.3	D	36.9
PM Peak Hour								
<u>Signalized Intersections</u>								
1. SR 169 / SE 231 st Street	C	33.6	D	37.7	D	38.2	D	40.7
2. SR 169 / SE Wax Road	B	16.6	B	17.5	B	17.7	B	18.0
3. SR 169 / Witte Road SE	D	40.0	E	56.8	E	59.6	D	47.9
4. SR 169 / SE 240 th Street	D	49.9	D	54.0	D	54.6	E	55.3
<u>Roundabout</u>								
5. SE 240 th Street / SE 228 th Street	A	3.4	A	4.5	A	4.5	A	5.8
<u>Stop-Controlled Intersection</u>								
6. SE 231 st Street / Witte Road SE ¹								
Northbound Left-Thru-Right	A	0.0	B	11.3	--	--	--	--
Eastbound Left-Turn	A	7.4	A	7.4	--	--	--	--
Westbound Left-Turn	A	0.0	A	0.0	--	--	--	--
Southbound Left-Thru-Right	A	9.5	B	13.3	--	--	--	--
Northbound Left-Turn	--	--	--	--	A	8.1	A	8.7
Eastbound Left-Thru-Right	--	--	--	--	C	15.2	C	21.0
Westbound Left-Thru-Right	--	--	--	--	B	12.9	C	15.3
Southbound Left-Turn	--	--	--	--	A	7.4	A	7.5

1. This intersection was evaluated as stop-controlled E-W for both future with project scenarios.

As shown in **Table 4**, all signalized and roundabout study intersections and individual movements at the stop controlled study intersection are anticipated to operate at acceptable levels (LOS D or better) in 2021 during the weekday AM and PM peak hours with the proposed project both without and with the City's planned SE 231st Street extension, with two exceptions. The SR-169 / Witte Road SE intersection is anticipated to operate at LOS E during the weekday PM peak hour with the proposed project without the City's planned SE 231st Street extension and LOS D with the planned extension. It should be noted that this intersection is anticipated to operate at LOS E in 2021 under baseline conditions without the proposed project. Additionally, the SR 169 / SE 240th Street intersection is anticipated to operate at LOS D during the weekday PM peak hour with the proposed project without the City's planned SE 231st Street extension and LOS E with the planned extension.

Note that while all of the signalized study intersections on SR-169 appear to be operating at acceptable levels from a delay standpoint under existing conditions, queues from each of these signals routinely extend beyond the existing storage area between the signalized intersections during the weekday PM peak hour.

Site Access Evaluation

The following summarizes the site access evaluation which includes driveway spacing, sight distance assessment, level of service analyses, and turn lane evaluation at each of the proposed site access locations.

Driveway Spacing

Based on City of Maple Valley *Municipal Code* Section 12.10.310 and Standard Plan MV-3-005, the minimum spacing between driveways that serve the same parcel of land is 18 feet. Based on the current site plan, all proposed site access locations are all at least 18 feet apart, meeting city requirements.

Sight Distance Assessment

The following summarizes the results of the sight distance assessment conducted at the proposed site access locations on Witte Road SE based on review of the AASHTO *A Policy on Geometric Design of Highways and Streets* and field measurements. All proposed site access driveway locations on the new SE 231st Street extension are expected to be constructed with adequate sight distance. The posted speed limit on Witte Road SE in the vicinity of the proposed site access locations is 35 MPH. A design speed of 40 MPH (posted speed + 5 MPH) was assumed for this analysis. The grade on Witte Road SE in the vicinity of the proposed site access driveways is approximately 4% downgrade in the eastbound direction. Therefore, adjustments were made to account for grade.

Intersection Sight Distance (ISD):

Based on the current edition of AASHTO, the minimum required ISD for a 40 MPH design speed is 445 feet. ISD was measured from a point 14.5 feet back from the edge of traveled way and 3.5 feet above the road surface, looking at an object 3.5 feet above the road surface. The ISD exhibits were provided by Barghausen and are included in **Attachment D**. Based on the exhibits, the available ISD at both proposed site access locations on Witte Road SE are expected to meet AASHTO standards.

Stopping Sight Distance (SSD):

The grade on Witte Road SE in the vicinity of the proposed site access driveway locations is approximately 4% downgrade in the eastbound direction. Therefore, adjustments were made to account for grade. Based on equations documented in AASHTO, the minimum required SSD for a 40 MPH design speed with a 4%

downgrade (eastbound direction) is 320 feet and 285 feet with a 4% upgrade (westbound direction). SSD was measured based on an approaching vehicle driver eye height of 3.5 feet and an object height of 2.0 feet. Based on field measurements, the available stopping sight distance at both proposed site access locations on Witte Road SE are expected to meet AASHTO standards.

Site Access Operations

Vehicular access to the proposed Maple Valley Logistics project would be provided by two (2) driveways on Witte Road SE and three (3) driveways on the new SE 231st Street extension. **Tables 5** summarizes the weekday PM peak hour LOS analysis results at the proposed site access driveway locations. Detailed LOS calculation sheets are included in **Attachment C**.

Table 5
Project Site Access Analysis – AM and PM Peak Hour LOS Summary

Study Intersection/Movement	w/o SE 231 st Street Extension			w/ SE 231 st Street Extension		
	LOS	Delay (sec)	95 th Percentile Queues (ft)	LOS	Delay (sec)	95 th Percentile Queues (ft)
A. East Site Access / Witte Road SE						
Northbound Shared Left-Right	B	11.3	<25'	A	9.6	<25'
Westbound Left-Turn	A	7.5	0'	A	7.5	0'
B. West Site Access / Witte Road SE						
Northbound Shared Left-Right	B	11.2	<25'	A	9.6	<25'
Westbound Left-Turn	A	7.5	0'	A	7.5	0'
C. SE 231st Street / North Site Access						
Northbound Left-Turn	A	0.0	0'	A	8.1	0'
Eastbound Shared Left-Thru-Right	B	10.5	< 25'	B	12.2	<25'
Westbound Shared Left-Thru-Right	A	8.8	< 25'	B	11.0	<25'
Southbound Left-Turn	A	7.4	0'	A	7.5	0'
D. SE 231st Street / Middle Site Access						
Westbound Shared Left-Right	A	8.7	< 25'	B	10.2	<25'
Southbound Left-Turn	A	7.4	0'	A	7.4	0'
E. SE 231st Street / South Site Access						
Northbound Left-Turn	A	0.0	0'	A	0.0	0'
Eastbound Shared Left-Right	B	11.0	0'	B	12.6	0'

As shown in **Table 5**, the individual movements at the proposed site access locations are expected to operate at acceptable levels (LOS B or better) with minimal queuing during the PM peak hours in 2021 without or with the City's planned SE 231st Street extension.

Turn Lane Evaluation

The potential need for left-turn and right-turn lanes was evaluated at each of the proposed site access locations based on Exhibits 1310-7a (left-turn storage guidelines) and 1310-11 (right-turn lane guidelines) included in the *WSDOT Design Manual*.

Future 2021 traffic volumes during the weekday PM peak hours used in the turn lane evaluation were shown previously in **Figures 7 and 8**. Based on future 2021 traffic volumes, neither a dedicated left-turn or right-turn

lane would be recommended at any of the proposed site access locations without or with the SE 231st Street extension. Additionally, the individual movements at each of the proposed site access locations are expected to operate at acceptable levels with minimal queuing. The WSDOT turn lane exhibits used in turn lane evaluation are included in **Attachment E**.

Mitigation

Transportation Impact Fees

To mitigate long-term traffic impacts of the proposed Maple Valley Logistics project, the City of Maple Valley requires payment of a transportation impact fee to help fund city-wide transportation improvements. The City's currently adopted transportation impact fee rate is \$4,437 per new PM peak hour trip. Transportation impact fees are due at the time of building permit issuance and impact fee rates are subject to change. The impact fee shall be based upon the schedule in effect at the time of issuance of the permit.

Based on 135 new PM peak hour trips generated by the Maple Valley Logistics project, the estimated transportation impact fee is \$598,995 (\$4,437 X 135 new PM peak hour trips).

SE 231st Street:

The project will construct and dedicate the portion of SE 231st Street located in Tract B of the Site Plan, and the Witte Road frontage improvements located within Lot 2 and Tract A. Since the City's Transportation Impact Fee (TIF) program includes the SE 231st Street Connection (Witte Road to SE 240th Street), the improvements are eligible for credit against the project traffic impact fee.

Traffic Management Plan (TMP)

To mitigate the anticipated additional holiday season trips and ensure there are no off-site parking issues, the tenant proposes the following 12 TMP strategies:

1. Carpool/Vanpool Parking – provide designated carpool/vanpool parking stalls near building entrances.
2. Carpool and Vanpool Ride-Matching Services – tenant to designate an on-site operations manager as the employee contact responsible for matching potential carpool and vanpool drivers and riders via an application system.
3. Bicycle Parking – provide more on-site bicycle parking than required by code.
4. Passenger Loading Zones – a loading zone will be identified for carpool/vanpool drop offs near the front of the building.
5. Pedestrian Connections – designate pedestrian circulation within the site and extended to existing City sidewalks.
6. Direct Route to Transit – encourage City to request new transit stop at SR 169/Witte Road. (note: nearest existing stop is at SR-169/SE 240th Street approximately a half mile walk from the site).
7. Subsidize Transit Passes – offer on-site employees subsidized transit passes (i.e. Orca card).
8. Guaranteed Ride Home – make available to employees the existing King County Metro guaranteed ride home program.

9. Designated Employer Contact – the on-site operations manager name and phone number will be provided to the City at the time it is known. The manager will be the primary contact for carpool and vanpool matching, and on-site communications related to auto-reduction measures.
10. Informational Kiosk – the on-site manager will display the following information in a prominent location including: transit routes, carpool and vanpool information. This information can also be housed within the tenant’s internal intranet pages.
11. Promotional Items – the informational kiosk will contain the following items: a new employee packet with transit information, rideshare options.
12. Annual Survey – commute surveys will be conducted bi-annually consistent with the WA CTR program.

If you have any questions regarding the information presented in this memo, please feel free to contact me at (206) 390-7253 or spenser@tenw.com.

cc: Brian Mattson – Panattoni Development Company, Inc
Jeff Schramm – TENW Principal

Attachments

ATTACHMENT A

Trip Generation Calculations

**Maple Valley Logistics
Trip Generation Summary**

Land Use	Units ¹	ITE	Directional Distribution		Trip Rate ²	Trips Generated		
			In	Out		In	Out	Total
Daily								
Proposed Use:								
High-Cube Fulfillment Center Warehouse - Sort	112,104 GFA	155	50%	50%	6.44	361	361	722
New Daily Trips =						361	361	722
AM Peak Hour								
Proposed Use:								
High-Cube Fulfillment Center Warehouse - Sort	112,104 GFA	155	81%	19%	0.87	79	19	98
New AM Peak Hour Trips =						79	19	98
PM Peak Hour								
Proposed Use:								
High-Cube Fulfillment Center Warehouse - Sort	112,104 GFA	155	39%	61%	1.20	53	82	135
New PM Peak Hour Trips =						53	82	135

Notes:

¹ GFA = Gross Floor Area.

² Land Use Code and trip rates based on ITE Trip Generation Manual, 10th Edition (2017) & 10th Edition Supplement (2020).

Truck Trip Rate ²	Directional Distribution		Truck Trip Generation			Non-Truck Trip Generation		
	In	Out	Enter	Exit	Total	Enter	Exit	Total
0.19	50%	50%	10	11	21	351	350	701
			10	11	21	351	350	701
0.02	50%	50%	1	1	2	78	18	96
			1	1	2	78	18	96
0.02	46%	54%	1	1	2	52	81	133
			1	1	2	52	81	133

ATTACHMENT B

Existing AM and PM Peak Hour Traffic Volumes

Shifts from SE 231st Street Extension

Total Pipeline PM Peak Hour Traffic Volumes



Prepared for: **City of Maple Valley**
Traffic Count Consultants, Inc.

Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: SR-169 & Witte Rd SE
Location: Maple Valley, Washington

Date of Count: Tues 9/18/2018
Checked By: Jess

Time Interval Ending at	From North on (SB) SR-169				From South on (NB) SR-169				From East on (WB) Witte Rd SE				From West on (EB) Witte Rd SE				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
7:15 A	22	1	120	72	13	2	273	3	0	1	3	0	3	190	4	2	671
7:30 A	26	0	146	49	15	1	272	4	1	4	0	0	1	197	4	2	679
7:45 A	10	0	102	45	12	1	269	5	0	0	0	0	1	195	6	2	625
8:00 A	7	2	118	74	16	1	271	4	0	2	1	0	1	203	7	1	684
8:15 A	11	0	120	68	10	1	275	5	0	1	2	1	0	192	4	2	671
8:30 A	10	2	122	73	9	0	250	6	0	2	1	0	3	156	7	3	622
8:45 A	25	1	177	78	8	1	205	2	0	3	4	0	10	158	15	4	648
9:00 A	9	1	141	67	15	1	259	7	0	3	0	2	6	169	7	7	664
9:15 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Total Survey	120	7	1046	526	98	8	2074	36	1	16	11	3	25	1460	54	23	5264
Peak Hour: 7:00 AM to 8:00 AM																	
Total	65	3	486	240	56	5	1085	16	1	7	4	0	6	785	21	7	2659
Approach	729				1106				11				813				2659
%HV	8.9%				5.1%				9.1%				0.7%				4.8%
PHF	0.93				0.99				0.69				0.96				0.97

SR-169
 2599 (Total)
 729 (Northbound)
 1870 (Southbound)

Witte Rd SE
 240 (Westbound)
 486 (Eastbound)
 3 (Northbound)
 11 (Southbound)

7:00 AM to 8:00 AM

SR-169
 500 (Northbound)
 1106 (Southbound)
 1606 (Total)

Witte Rd SE
 0 (Westbound)
 4 (Eastbound)
 7 (Northbound)
 11 (Southbound)
 51 (Total)

SR-169
 5 (Northbound)
 1085 (Southbound)
 16 (Total)

Witte Rd SE
 0 (Westbound)
 0 (Eastbound)
 0 (Northbound)
 40 (Southbound)
 40 (Total)

PHF Peak Hour Volume
 2736

PHF %HV

EB	0.96	0.7%	
WB	0.69	9.1%	
In: 2659	NB	0.99	5.1%
Out: 2659	SB	0.93	8.9%
T Int.	0.97	4.8%	

Check
 In: 2659
 Out: 2659
 T Int. 0.97

Conditions:

PEDs Across:

	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08		1	1		2
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	1	1	0	2

Bicycles From:

	N	S	E	W	
INT 01					1
INT 02					0
INT 03	1				1
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	0	0	1	2

Special Notes

ATTACHMENT C

LOS Methodology & Calculations

Level of Service Methodology

Level of service calculations for intersections were based on methodology and procedures outlined in the 2016 *Highway Capacity Manual*, 6th edition (HCM 6), Transportation Research Board using *Synchro 10* traffic analysis software.

LOS generally refers to the degree of congestion on a roadway or intersection. It is a measure of vehicle operating speed, travel time, travel delays, and driving comfort. A letter scale from A to F generally describes intersection LOS. At signalized intersections, LOS A represents free-flow conditions (motorists experience little or no delays), and LOS F represents forced-flow conditions where motorists experience an average delay in excess of 80 seconds per vehicle.

The LOS reported at stop-controlled intersections is based on the average control delay and can be reported for each controlled minor approach, controlled minor lane group, and controlled major-street movement (and for the overall intersection at all-way stop controlled intersections. Additional v/c ratio criteria apply to lane group or movement LOS only).

Table C1 outlines the current HCM 6 LOS criteria for signalized and stop-controlled intersections based on these methodologies.

Table C1
LOS Criteria for Signalized and Stop Controlled Intersections¹

SIGNALIZED INTERSECTIONS			UNSIGNALIZED INTERSECTIONS		
Control Delay (sec/veh)	LOS by Volume-to Capacity (V/C) Ratio ²		Control Delay (sec/veh)	LOS by Volume-to Capacity (V/C) Ratio ³	
	≤ 1.0	> 1.0		≤ 1.0	> 1.0
≤ 10	A	F	≤ 10	A	F
> 10 to ≤ 20	B	F	> 10 to ≤ 15	B	F
> 20 to ≤ 35	C	F	> 15 to ≤ 25	C	F
> 35 to ≤ 55	D	F	> 25 to ≤ 35	D	F
> 55 to ≤ 80	E	F	> 35 to ≤ 50	E	F
> 80	F	F	> 50	F	F

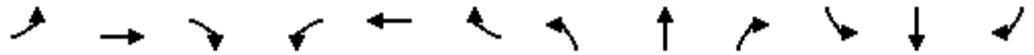
¹ Source: Highway Capacity Manual, 6th Edition, Transportation Research Board, 2016.

² For approach-based and intersection-wide assessments at signals, LOS is defined solely by control delay.

³ For two-way stop controlled intersections, the LOS criteria apply to each lane on a given approach and to each approach on the minor street. LOS is not calculated for major-street approaches or for the intersection as a whole at two-way stop controlled intersections. For approach-based and intersection-wide assessments at all-way stop controlled intersections, LOS is solely defined by control delay.

Lanes, Volumes, Timings
 3: SR 169 & SE Witte Rd/Witte Rd SE

08/31/2020

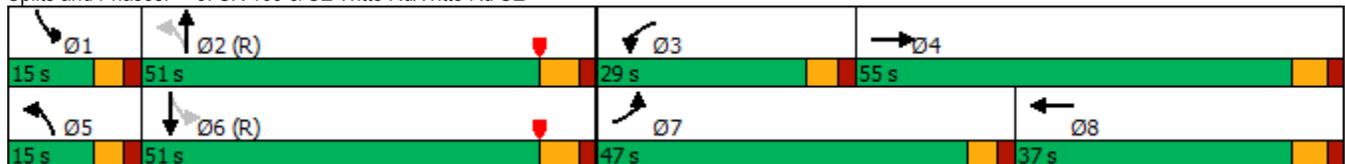


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↔		↔	↔		↔	↕↔		↔	↕↔	
Traffic Volume (vph)	801	21	7	7	4	0	5	1107	16	3	496	245
Future Volume (vph)	801	21	7	7	4	0	5	1107	16	3	496	245
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Grade (%)		0%			-8%			-6%			4%	
Storage Length (ft)	130		0	180		0	300		200	150		0
Storage Lanes	2		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		971			453			1789			444	
Travel Time (s)		18.9			8.8			34.9			8.6	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	1%	1%	1%	9%	9%	9%	5%	5%	5%	9%	9%	9%
Shared Lane Traffic (%)												
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	10.5	34.0		10.5	37.0		10.5	33.3		10.5	36.3	
Total Split (s)	47.0	55.0		29.0	37.0		15.0	51.0		15.0	51.0	
Total Split (%)	31.3%	36.7%		19.3%	24.7%		10.0%	34.0%		10.0%	34.0%	
Yellow Time (s)	3.5	4.0		3.5	4.0		3.5	4.3		3.5	4.3	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	6.0		5.5	6.0		5.5	6.3		5.5	6.3	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?	Yes	Yes										
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	

Intersection Summary

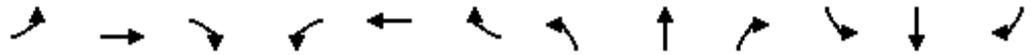
Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 45 (30%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow
 Natural Cycle: 115
 Control Type: Actuated-Coordinated

Splits and Phases: 3: SR 169 & SE Witte Rd/Witte Rd SE



HCM 6th Signalized Intersection Summary
 3: SR 169 & SE Witte Rd/Witte Rd SE

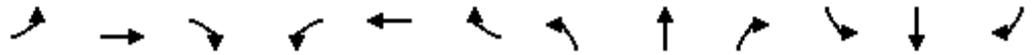
08/31/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↔		↔	↔		↔	↕↔		↔	↕↔	
Traffic Volume (veh/h)	801	21	7	7	4	0	5	1107	16	3	496	245
Future Volume (veh/h)	801	21	7	7	4	0	5	1107	16	3	496	245
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2183	2183	2183	2408	2408	2408	2386	2386	2386	1936	1936	1936
Adj Flow Rate, veh/h	826	22	7	7	4	0	5	1141	16	3	511	253
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	1	1	1	9	9	9	5	5	5	9	9	9
Cap, veh/h	933	450	143	19	148	0	388	2509	35	228	1301	641
Arrive On Green	0.23	0.28	0.28	0.01	0.06	0.00	0.01	0.55	0.55	0.00	0.55	0.55
Sat Flow, veh/h	4033	1585	504	2293	2408	0	2273	4577	64	1844	2383	1175
Grp Volume(v), veh/h	826	0	29	7	4	0	5	565	592	3	394	370
Grp Sat Flow(s),veh/h/ln	2017	0	2089	2293	2408	0	2273	2267	2374	1844	1840	1719
Q Serve(g_s), s	29.7	0.0	1.5	0.5	0.2	0.0	0.1	22.5	22.5	0.1	18.6	18.7
Cycle Q Clear(g_c), s	29.7	0.0	1.5	0.5	0.2	0.0	0.1	22.5	22.5	0.1	18.6	18.7
Prop In Lane	1.00		0.24	1.00		0.00	1.00		0.03	1.00		0.68
Lane Grp Cap(c), veh/h	933	0	594	19	148	0	388	1243	1301	228	1004	938
V/C Ratio(X)	0.89	0.00	0.05	0.36	0.03	0.00	0.01	0.45	0.45	0.01	0.39	0.39
Avail Cap(c_a), veh/h	1116	0	682	359	498	0	518	1243	1301	338	1004	938
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.7	0.0	39.0	74.0	66.2	0.0	16.3	20.4	20.4	16.9	19.7	19.7
Incr Delay (d2), s/veh	7.7	0.0	0.0	8.2	0.1	0.0	0.0	1.2	1.1	0.0	1.2	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.0	0.0	0.8	0.3	0.1	0.0	0.1	12.2	12.8	0.0	8.3	7.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	63.5	0.0	39.0	82.2	66.3	0.0	16.3	21.6	21.6	16.9	20.8	21.0
LnGrp LOS	E	A	D	F	E	A	B	C	C	B	C	C
Approach Vol, veh/h		855			11			1162			767	
Approach Delay, s/veh		62.6			76.4			21.6			20.9	
Approach LOS		E			E			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.1	88.5	6.8	48.6	6.4	88.2	40.2	15.2				
Change Period (Y+Rc), s	5.5	6.3	5.5	6.0	5.5	6.3	5.5	6.0				
Max Green Setting (Gmax), s	9.5	44.7	23.5	49.0	9.5	44.7	41.5	31.0				
Max Q Clear Time (g_c+I1), s	2.1	24.5	2.5	3.5	2.1	20.7	31.7	2.2				
Green Ext Time (p_c), s	0.0	10.7	0.0	0.1	0.0	7.4	3.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			34.2									
HCM 6th LOS			C									

Lanes, Volumes, Timings
1: SR 169 & SE 231st St

08/31/2020

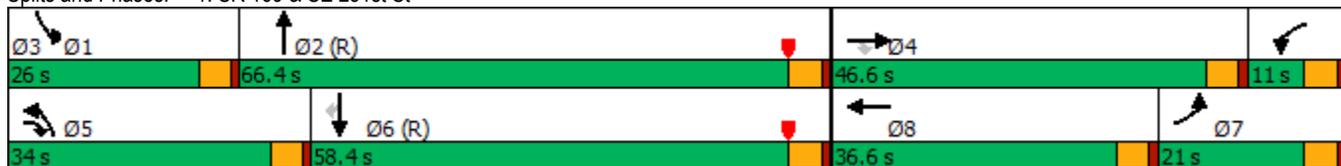


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	145	685	25	40	15	515	435	15	10	1105	145
Future Volume (vph)	130	145	685	25	40	15	515	435	15	10	1105	145
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Storage Length (ft)	250		0	0		170	300		0	150		150
Storage Lanes	1		2	1		1	2		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		693			553			655			674	
Travel Time (s)		13.5			10.8			12.8			13.1	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA	pm+ov	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases			4									6
Detector Phase	7	4	4 5	3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	10.0	34.6	10.0	10.0	36.6		10.0	33.0		10.0	33.0	33.0
Total Split (s)	21.0	46.6	34.0	11.0	36.6		34.0	66.4		26.0	58.4	58.4
Total Split (%)	14.0%	31.1%	22.7%	7.3%	24.4%		22.7%	44.3%		17.3%	38.9%	38.9%
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	4.0		3.6	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	4.6	4.6	4.6		4.6	5.0		4.6	5.0	5.0
Lead/Lag	Lag	Lead	Lead	Lag	Lead		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	C-Min

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 4 (3%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated

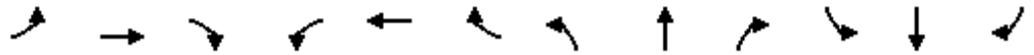
Splits and Phases: 1: SR 169 & SE 231st St



HCM 6th Signalized Intersection Summary

1: SR 169 & SE 231st St

08/31/2020

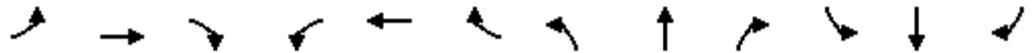


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	130	145	685	25	40	15	515	435	15	10	1105	145
Future Volume (veh/h)	130	145	685	25	40	15	515	435	15	10	1105	145
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2166	2166	2166	2131	2131	2131	2166	2166	2166	2183	2183	2183
Adj Flow Rate, veh/h	141	158	692	27	43	16	560	473	16	11	1201	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	4	4	4	2	2	2	1	1	1
Cap, veh/h	301	430	1156	46	111	41	646	2603	88	25	2040	907
Arrive On Green	0.15	0.20	0.20	0.02	0.08	0.08	0.27	1.00	1.00	0.01	0.49	0.49
Sat Flow, veh/h	2063	2166	3190	2030	1472	548	4001	4061	137	2079	4147	1844
Grp Volume(v), veh/h	141	158	692	27	0	59	560	239	250	11	1201	5
Grp Sat Flow(s),veh/h/ln	2063	2166	1595	2030	0	2020	2001	2057	2140	2079	2074	1844
Q Serve(g_s), s	9.4	9.5	21.8	2.0	0.0	4.2	20.0	0.0	0.0	0.8	31.1	0.1
Cycle Q Clear(g_c), s	9.4	9.5	21.8	2.0	0.0	4.2	20.0	0.0	0.0	0.8	31.1	0.1
Prop In Lane	1.00		1.00	1.00		0.27	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	301	430	1156	46	0	152	646	1319	1372	25	2040	907
V/C Ratio(X)	0.47	0.37	0.60	0.59	0.00	0.39	0.87	0.18	0.18	0.43	0.59	0.01
Avail Cap(c_a), veh/h	301	606	1415	87	0	431	784	1319	1372	297	2040	907
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	0.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00
Uniform Delay (d), s/veh	58.7	51.9	26.7	72.6	0.0	66.0	53.2	0.0	0.0	73.6	27.3	6.7
Incr Delay (d2), s/veh	1.6	0.7	0.7	16.1	0.0	2.3	9.0	0.3	0.3	15.6	1.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	5.2	8.4	1.2	0.0	2.2	10.0	0.1	0.1	0.5	15.6	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.3	52.7	27.4	88.7	0.0	68.3	62.3	0.3	0.3	89.1	28.5	6.7
LnGrp LOS	E	D	C	F	A	E	E	A	A	F	C	A
Approach Vol, veh/h		991			86			1049			1217	
Approach Delay, s/veh		36.1			74.7			33.4			29.0	
Approach LOS		D			E			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.4	101.2	8.0	34.4	28.8	78.8	26.5	15.9				
Change Period (Y+Rc), s	4.6	5.0	4.6	4.6	4.6	5.0	4.6	4.6				
Max Green Setting (Gmax), s	21.4	61.4	6.4	42.0	29.4	53.4	16.4	32.0				
Max Q Clear Time (g_c+I1), s	2.8	2.0	4.0	23.8	22.0	33.1	11.4	6.2				
Green Ext Time (p_c), s	0.0	3.2	0.0	5.9	2.2	9.1	0.3	0.2				
Intersection Summary												
HCM 6th Ctrl Delay			33.6									
HCM 6th LOS			C									

Lanes, Volumes, Timings

2: SE Wax Rd & SR 169

08/31/2020

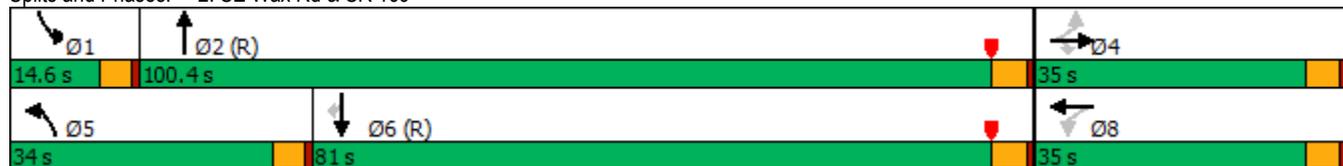


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	120	20	385	40	25	45	245	800	25	45	1725	130
Future Volume (vph)	120	20	385	40	25	45	245	800	25	45	1725	130
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Storage Length (ft)	150		68	250		0	0		0	150		150
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			25			35			35	
Link Distance (ft)		755			389			480			655	
Travel Time (s)		14.7			10.6			9.4			12.8	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Detector Phase	4	4	4	8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		10.0	10.0		10.0	25.0	25.0
Minimum Split (s)	32.6	32.6	32.6	34.6	34.6		14.6	32.0		14.6	30.0	30.0
Total Split (s)	35.0	35.0	35.0	35.0	35.0		34.0	100.4		14.6	81.0	81.0
Total Split (%)	23.3%	23.3%	23.3%	23.3%	23.3%		22.7%	66.9%		9.7%	54.0%	54.0%
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	4.0		3.6	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	4.6	4.6	4.6		4.6	5.0		4.6	5.0	5.0
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	C-Min

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 12 (8%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
 Natural Cycle: 105
 Control Type: Actuated-Coordinated

Splits and Phases: 2: SE Wax Rd & SR 169



HCM 6th Signalized Intersection Summary

2: SE Wax Rd & SR 169

08/31/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	120	20	385	40	25	45	245	800	25	45	1725	130
Future Volume (veh/h)	120	20	385	40	25	45	245	800	25	45	1725	130
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	0.99		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2200	2200	2200	2200	2200	2200	2166	2166	2166	2183	2183	2183
Adj Flow Rate, veh/h	129	22	131	43	27	48	263	860	27	48	1855	140
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	0	0	0	0	0	0	2	2	2	1	1	1
Cap, veh/h	208	338	284	229	109	193	295	2825	89	120	2524	1121
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.14	0.69	0.69	0.12	1.00	1.00
Sat Flow, veh/h	1335	2200	1846	1244	705	1254	2063	4072	128	2079	4147	1842
Grp Volume(v), veh/h	129	22	131	43	0	75	263	435	452	48	1855	140
Grp Sat Flow(s),veh/h/ln	1335	2200	1846	1244	0	1960	2063	2057	2142	2079	2074	1842
Q Serve(g_s), s	14.1	1.3	9.7	4.6	0.0	5.1	18.8	12.3	12.3	3.2	0.0	0.0
Cycle Q Clear(g_c), s	19.2	1.3	9.7	5.9	0.0	5.1	18.8	12.3	12.3	3.2	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.64	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	208	338	284	229	0	302	295	1427	1486	120	2524	1121
V/C Ratio(X)	0.62	0.06	0.46	0.19	0.00	0.25	0.89	0.30	0.30	0.40	0.73	0.12
Avail Cap(c_a), veh/h	274	446	374	289	0	397	404	1427	1486	139	2524	1121
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.75	0.75	0.75
Uniform Delay (d), s/veh	64.3	54.2	57.8	56.7	0.0	55.8	63.2	8.9	8.9	63.9	0.0	0.0
Incr Delay (d2), s/veh	3.0	0.1	1.2	0.4	0.0	0.4	17.0	0.6	0.5	1.6	1.5	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	0.7	4.7	1.5	0.0	2.6	11.2	5.5	5.8	1.7	0.5	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.2	54.3	59.0	57.1	0.0	56.3	80.1	9.5	9.4	65.6	1.5	0.2
LnGrp LOS	E	D	E	E	A	E	F	A	A	E	A	A
Approach Vol, veh/h		282			118			1150			2043	
Approach Delay, s/veh		62.4			56.6			25.6			2.9	
Approach LOS		E			E			C			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.2	109.1		27.7	26.0	96.3		27.7				
Change Period (Y+Rc), s	4.6	5.0		4.6	4.6	5.0		4.6				
Max Green Setting (Gmax), s	10.0	95.4		30.4	29.4	76.0		30.4				
Max Q Clear Time (g_c+I1), s	5.2	14.3		21.2	20.8	2.0		7.9				
Green Ext Time (p_c), s	0.0	10.9		0.7	0.6	47.6		0.4				

Intersection Summary

HCM 6th Ctrl Delay	16.6
HCM 6th LOS	B

Lanes, Volumes, Timings
 3: SR 169 & SE Witte Rd/Witte Rd SE

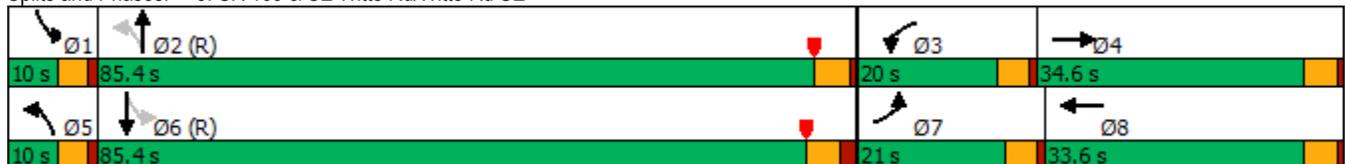
08/31/2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	410	55	15	160	105	10	25	760	30	5	1375	760
Future Volume (vph)	410	55	15	160	105	10	25	760	30	5	1375	760
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Grade (%)		0%			-8%			-6%			4%	
Storage Length (ft)	130		0	180		0	300		200	150		0
Storage Lanes	2		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		971			453			1789			444	
Travel Time (s)		18.9			8.8			34.9			8.6	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	10.0	32.6		10.0	33.6		10.0	33.0		10.0	34.0	
Total Split (s)	21.0	34.6		20.0	33.6		10.0	85.4		10.0	85.4	
Total Split (%)	14.0%	23.1%		13.3%	22.4%		6.7%	56.9%		6.7%	56.9%	
Yellow Time (s)	3.5	3.6		3.5	3.6		3.5	4.0		3.5	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.6		4.5	4.6		4.5	5.0		4.5	6.0	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?	Yes	Yes										
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 33 (22%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow
 Natural Cycle: 150
 Control Type: Actuated-Coordinated

Splits and Phases: 3: SR 169 & SE Witte Rd/Witte Rd SE



HCM 6th Signalized Intersection Summary

3: SR 169 & SE Witte Rd/Witte Rd SE

08/31/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↖		↖	↖		↖	↖↗		↖	↖↗	
Traffic Volume (veh/h)	410	55	15	160	105	10	25	760	30	5	1375	760
Future Volume (veh/h)	410	55	15	160	105	10	25	760	30	5	1375	760
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2200	2200	2200	2547	2547	2547	2456	2456	2456	2074	2074	2074
Adj Flow Rate, veh/h	427	57	16	167	109	10	26	792	31	5	1432	792
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	0	0	0	1	1	1	1	1	1	1	1	1
Cap, veh/h	447	189	53	199	198	18	115	3051	119	440	1648	831
Arrive On Green	0.11	0.11	0.11	0.08	0.09	0.09	0.02	0.67	0.67	0.01	0.65	0.65
Sat Flow, veh/h	4065	1647	462	2426	2294	210	2339	4577	179	1975	2532	1276
Grp Volume(v), veh/h	427	0	73	167	0	119	26	404	419	5	1083	1141
Grp Sat Flow(s),veh/h/ln	2032	0	2110	2426	0	2505	2339	2333	2423	1975	1970	1838
Q Serve(g_s), s	15.7	0.0	4.8	10.2	0.0	6.8	0.6	10.5	10.5	0.1	64.0	85.6
Cycle Q Clear(g_c), s	15.7	0.0	4.8	10.2	0.0	6.8	0.6	10.5	10.5	0.1	64.0	85.6
Prop In Lane	1.00		0.22	1.00		0.08	1.00		0.07	1.00		0.69
Lane Grp Cap(c), veh/h	447	0	242	199	0	217	115	1555	1615	440	1282	1196
V/C Ratio(X)	0.95	0.00	0.30	0.84	0.00	0.55	0.23	0.26	0.26	0.01	0.85	0.95
Avail Cap(c_a), veh/h	447	0	422	251	0	484	149	1555	1615	500	1282	1196
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	0.00	1.00	0.96	0.96	0.96	1.00	1.00	1.00
Uniform Delay (d), s/veh	66.4	0.0	60.9	67.9	0.0	65.7	36.3	10.1	10.1	9.1	20.3	24.1
Incr Delay (d2), s/veh	31.2	0.0	0.7	16.9	0.0	2.2	0.7	0.4	0.4	0.0	7.0	17.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.0	0.0	2.6	7.2	0.0	4.5	0.6	5.4	5.6	0.1	30.0	40.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	97.6	0.0	61.6	84.8	0.0	67.9	37.0	10.5	10.5	9.1	27.3	41.1
LnGrp LOS	F	A	E	F	A	E	D	B	B	A	C	D
Approach Vol, veh/h		500			286			849			2229	
Approach Delay, s/veh		92.4			77.7			11.3			34.3	
Approach LOS		F			E			B			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	5.4	106.0	16.8	21.8	7.8	103.6	21.0	17.6				
Change Period (Y+Rc), s	4.5	* 6	4.5	4.6	4.5	6.0	4.5	4.6				
Max Green Setting (Gmax), s	5.5	* 80	15.5	30.0	5.5	79.4	16.5	29.0				
Max Q Clear Time (g_c+I1), s	2.1	12.5	12.2	6.8	2.6	87.6	17.7	8.8				
Green Ext Time (p_c), s	0.0	9.7	0.1	0.2	0.0	0.0	0.0	0.3				

Intersection Summary

HCM 6th Ctrl Delay	40.0
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings

4: SR 169 & SE 240th St

08/31/2020

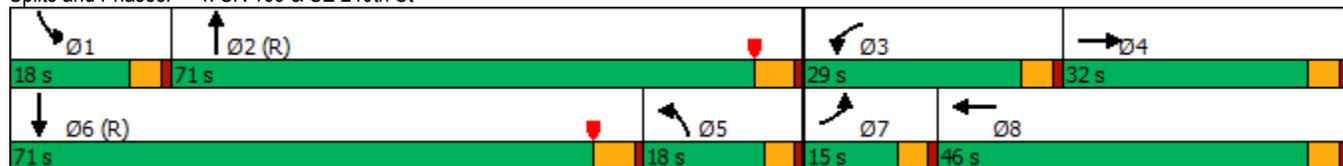


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	20	155	25	25	60	110	730	10	95	1375	45
Future Volume (vph)	65	20	155	25	25	60	110	730	10	95	1375	45
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Storage Length (ft)	0		180	200		0	300		130	380		150
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		345			804			1369			1789	
Travel Time (s)		7.8			18.3			26.7			34.9	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA										
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	10.0	29.5		10.0	30.5		10.0	29.5		10.0	29.0	
Total Split (s)	15.0	32.0		29.0	46.0		18.0	71.0		18.0	71.0	
Total Split (%)	10.0%	21.3%		19.3%	30.7%		12.0%	47.3%		12.0%	47.3%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	4.5		3.5	4.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	5.5		4.5	5.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes										
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 93 (62%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated

Splits and Phases: 4: SR 169 & SE 240th St



HCM 6th Signalized Intersection Summary

4: SR 169 & SE 240th St

08/31/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	20	155	25	25	60	110	730	10	95	1375	45
Future Volume (veh/h)	65	20	155	25	25	60	110	730	10	95	1375	45
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2200	2200	2200	2183	2183	2183	2183	2183	2183	2183	2183	2183
Adj Flow Rate, veh/h	69	21	165	27	27	64	117	777	11	101	1463	48
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	0	0	0	1	1	1	1	1	1	1	1	1
Cap, veh/h	91	26	206	47	58	138	624	2788	39	128	1723	56
Arrive On Green	0.04	0.12	0.12	0.02	0.10	0.10	0.30	0.67	0.67	0.02	0.14	0.14
Sat Flow, veh/h	2095	212	1664	2079	569	1348	2079	4186	59	2079	4097	134
Grp Volume(v), veh/h	69	0	186	27	0	91	117	385	403	101	739	772
Grp Sat Flow(s),veh/h/ln	2095	0	1876	2079	0	1917	2079	2074	2172	2079	2074	2158
Q Serve(g_s), s	4.9	0.0	14.5	1.9	0.0	6.7	6.3	11.4	11.4	7.3	52.2	52.4
Cycle Q Clear(g_c), s	4.9	0.0	14.5	1.9	0.0	6.7	6.3	11.4	11.4	7.3	52.2	52.4
Prop In Lane	1.00		0.89	1.00		0.70	1.00		0.03	1.00		0.06
Lane Grp Cap(c), veh/h	91	0	232	47	0	196	624	1381	1446	128	872	908
V/C Ratio(X)	0.76	0.00	0.80	0.58	0.00	0.46	0.19	0.28	0.28	0.79	0.85	0.85
Avail Cap(c_a), veh/h	147	0	344	340	0	530	624	1381	1446	187	906	942
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(l)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.34	0.34	0.34
Uniform Delay (d), s/veh	70.9	0.0	64.0	72.6	0.0	63.4	38.9	10.3	10.3	72.5	59.9	60.0
Incr Delay (d2), s/veh	11.9	0.0	8.1	10.7	0.0	1.7	0.1	0.5	0.5	4.8	3.7	3.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	0.0	7.5	1.2	0.0	3.4	3.3	5.3	5.5	4.2	30.1	31.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	82.8	0.0	72.1	83.3	0.0	65.1	39.1	10.8	10.8	77.3	63.6	63.6
LnGrp LOS	F	A	E	F	A	E	D	B	B	E	E	E
Approach Vol, veh/h		255			118			905			1612	
Approach Delay, s/veh		75.0			69.3			14.4			64.5	
Approach LOS		E			E			B			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.7	105.4	7.9	23.0	50.5	68.6	11.0	19.9				
Change Period (Y+Rc), s	4.5	5.5	4.5	4.5	5.5	* 5.5	4.5	4.5				
Max Green Setting (Gmax), s	13.5	65.5	24.5	27.5	13.5	* 66	10.5	41.5				
Max Q Clear Time (g_c+I1), s	9.3	13.4	3.9	16.5	8.3	54.4	6.9	8.7				
Green Ext Time (p_c), s	0.1	8.9	0.0	0.5	0.1	8.7	0.0	0.3				

Intersection Summary

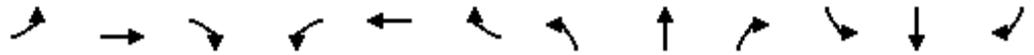
HCM 6th Ctrl Delay	49.9
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings
 5: SE 240th St & SE 228th St

08/31/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	125	0	0	110	0	0	0	0	0	0	0
Future Volume (vph)	0	125	0	0	110	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	2200	2200	1900	1900	2200	2200	2200	1900	2200	1900
Storage Length (ft)	150		150	150		150	0		0	150		150
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		30			30			30				30
Link Distance (ft)		804			666			190				594
Travel Time (s)		18.3			15.1			4.3				13.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)												
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary

Area Type: Other
 Control Type: Roundabout

HCM 6th Roundabout
5: SE 240th St & SE 228th St

08/31/2020

Intersection				
Intersection Delay, s/veh	3.4			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	136	120	0	0
Demand Flow Rate, veh/h	139	122	0	0
Vehicles Circulating, veh/h	0	0	139	122
Vehicles Exiting, veh/h	122	139	0	0
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	3.5	3.4	0.0	0.0
Approach LOS	A	A	-	-
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	139	122	0	0
Cap Entry Lane, veh/h	1380	1380	1197	1218
Entry HV Adj Factor	0.980	0.980	1.000	1.000
Flow Entry, veh/h	136	120	0	0
Cap Entry, veh/h	1353	1353	1197	1218
V/C Ratio	0.101	0.088	0.000	0.000
Control Delay, s/veh	3.5	3.4	3.0	3.0
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	0

Lanes, Volumes, Timings
 6: Witte Rd SE & SE 231st St

08/31/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	40	0	0	35	15	0	0	0	10	0	150
Future Volume (vph)	50	40	0	0	35	15	0	0	0	10	0	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			0%			9%	
Storage Length (ft)	150		150	150		150	0		0	150		150
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		35			35			35				35
Link Distance (ft)		323			286			358				239
Travel Time (s)		6.3			5.6			7.0				4.7
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	0%	0%	0%	1%	1%	1%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											

HCM 6th TWSC
6: Witte Rd SE & SE 231st St

08/31/2020

Intersection												
Int Delay, s/veh	6.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	50	40	0	0	35	15	0	0	0	10	0	150
Future Vol, veh/h	50	40	0	0	35	15	0	0	0	10	0	150
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	9	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	1	1	1	2	2	2	0	0	0	1	1	1
Mvmt Flow	57	45	0	0	40	17	0	0	0	11	0	170

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	57	0	0	45	0	0	293	216	45	208	208	49
Stage 1	-	-	-	-	-	-	159	159	-	49	49	-
Stage 2	-	-	-	-	-	-	134	57	-	159	159	-
Critical Hdwy	4.11	-	-	4.12	-	-	7.1	6.5	6.2	8.91	8.31	7.11
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	7.91	7.31	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	7.91	7.31	-
Follow-up Hdwy	2.209	-	-	2.218	-	-	3.5	4	3.3	3.509	4.009	3.309
Pot Cap-1 Maneuver	1554	-	-	1563	-	-	663	685	1031	677	622	1010
Stage 1	-	-	-	-	-	-	848	770	-	943	835	-
Stage 2	-	-	-	-	-	-	874	851	-	781	709	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1554	-	-	1563	-	-	535	659	1031	657	598	1010
Mov Cap-2 Maneuver	-	-	-	-	-	-	535	659	-	657	598	-
Stage 1	-	-	-	-	-	-	816	741	-	907	835	-
Stage 2	-	-	-	-	-	-	726	851	-	751	682	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	4.1	0	0	9.5
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1554	-	-	1563	-	-	977
HCM Lane V/C Ratio	-	0.037	-	-	-	-	-	0.186
HCM Control Delay (s)	0	7.4	0	-	0	-	-	9.5
HCM Lane LOS	A	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	-	0.1	-	-	0	-	-	0.7

Lanes, Volumes, Timings
 3: SR 169 & SE Witte Rd/Witte Rd SE

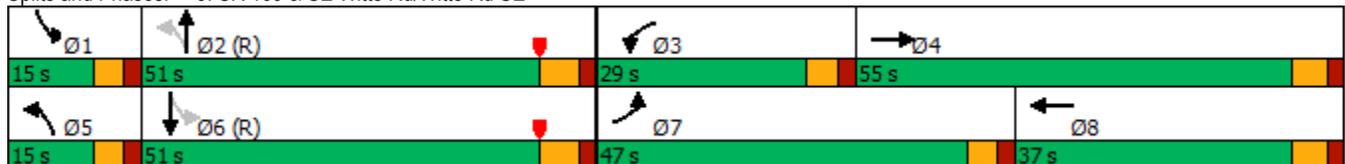
08/31/2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	885	22	8	8	4	0	5	1355	21	3	577	266
Future Volume (vph)	885	22	8	8	4	0	5	1355	21	3	577	266
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Grade (%)		0%			-8%			-6%			4%	
Storage Length (ft)	130		0	180		0	300		200	150		0
Storage Lanes	2		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		971			453			1789			444	
Travel Time (s)		18.9			8.8			34.9			8.6	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	1%	1%	1%	9%	9%	9%	5%	5%	5%	9%	9%	9%
Shared Lane Traffic (%)												
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	10.5	34.0		10.5	37.0		10.5	33.3		10.5	36.3	
Total Split (s)	47.0	55.0		29.0	37.0		15.0	51.0		15.0	51.0	
Total Split (%)	31.3%	36.7%		19.3%	24.7%		10.0%	34.0%		10.0%	34.0%	
Yellow Time (s)	3.5	4.0		3.5	4.0		3.5	4.3		3.5	4.3	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	6.0		5.5	6.0		5.5	6.3		5.5	6.3	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?	Yes	Yes										
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 45 (30%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow
 Natural Cycle: 135
 Control Type: Actuated-Coordinated

Splits and Phases: 3: SR 169 & SE Witte Rd/Witte Rd SE



HCM 6th Signalized Intersection Summary
 3: SR 169 & SE Witte Rd/Witte Rd SE

08/31/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	885	22	8	8	4	0	5	1355	21	3	577	266
Future Volume (veh/h)	885	22	8	8	4	0	5	1355	21	3	577	266
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2183	2183	2183	2408	2408	2408	2386	2386	2386	1936	1936	1936
Adj Flow Rate, veh/h	912	23	8	8	4	0	5	1397	22	3	595	274
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	1	1	1	9	9	9	5	5	5	9	9	9
Cap, veh/h	1007	467	163	22	149	0	325	2416	38	164	1287	592
Arrive On Green	0.25	0.30	0.30	0.01	0.06	0.00	0.01	0.53	0.53	0.00	0.53	0.53
Sat Flow, veh/h	4033	1545	538	2293	2408	0	2273	4568	72	1844	2443	1124
Grp Volume(v), veh/h	912	0	31	8	4	0	5	693	726	3	448	421
Grp Sat Flow(s),veh/h/ln	2017	0	2083	2293	2408	0	2273	2267	2373	1844	1840	1728
Q Serve(g_s), s	32.9	0.0	1.6	0.5	0.2	0.0	0.2	31.1	31.2	0.1	22.9	22.9
Cycle Q Clear(g_c), s	32.9	0.0	1.6	0.5	0.2	0.0	0.2	31.1	31.2	0.1	22.9	22.9
Prop In Lane	1.00		0.26	1.00		0.00	1.00		0.03	1.00		0.65
Lane Grp Cap(c), veh/h	1007	0	630	22	149	0	325	1199	1255	164	969	910
V/C Ratio(X)	0.91	0.00	0.05	0.37	0.03	0.00	0.02	0.58	0.58	0.02	0.46	0.46
Avail Cap(c_a), veh/h	1116	0	680	359	498	0	454	1199	1255	273	969	910
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.5	0.0	37.1	73.8	66.1	0.0	18.2	24.0	24.0	19.8	22.2	22.2
Incr Delay (d2), s/veh	9.9	0.0	0.0	7.6	0.1	0.0	0.0	2.0	1.9	0.1	1.6	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	18.0	0.0	0.8	0.4	0.1	0.0	0.1	17.2	18.0	0.1	10.3	9.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	64.4	0.0	37.1	81.4	66.2	0.0	18.2	26.0	25.9	19.8	23.8	23.9
LnGrp LOS	E	A	D	F	E	A	B	C	C	B	C	C
Approach Vol, veh/h		943			12			1424			872	
Approach Delay, s/veh		63.5			76.3			25.9			23.8	
Approach LOS		E			E			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.1	85.6	6.9	51.4	6.4	85.3	43.0	15.3				
Change Period (Y+Rc), s	5.5	6.3	5.5	6.0	5.5	6.3	5.5	6.0				
Max Green Setting (Gmax), s	9.5	44.7	23.5	49.0	9.5	44.7	41.5	31.0				
Max Q Clear Time (g_c+I1), s	2.1	33.2	2.5	3.6	2.2	24.9	34.9	2.2				
Green Ext Time (p_c), s	0.0	8.6	0.0	0.1	0.0	7.8	2.6	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			36.5									
HCM 6th LOS			D									

Lanes, Volumes, Timings
1: SR 169 & SE 231st St

08/31/2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	135	212	804	25	87	55	602	503	15	61	1214	150
Future Volume (vph)	135	212	804	25	87	55	602	503	15	61	1214	150
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Storage Length (ft)	250		0	0		170	300		0	150		150
Storage Lanes	1		2	1		1	2		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		693			553			655			674	
Travel Time (s)		13.5			10.8			12.8			13.1	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA	pm+ov	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases			4									6
Detector Phase	7	4	4 5	3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	10.0	34.6	10.0	10.0	36.6		10.0	33.0		10.0	33.0	33.0
Total Split (s)	21.0	46.6	34.0	11.0	36.6		34.0	66.4		26.0	58.4	58.4
Total Split (%)	14.0%	31.1%	22.7%	7.3%	24.4%		22.7%	44.3%		17.3%	38.9%	38.9%
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	4.0		3.6	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	4.6	4.6	4.6		4.6	5.0		4.6	5.0	5.0
Lead/Lag	Lag	Lead	Lead	Lag	Lead		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	C-Min

Intersection Summary

Area Type: Other

Cycle Length: 150

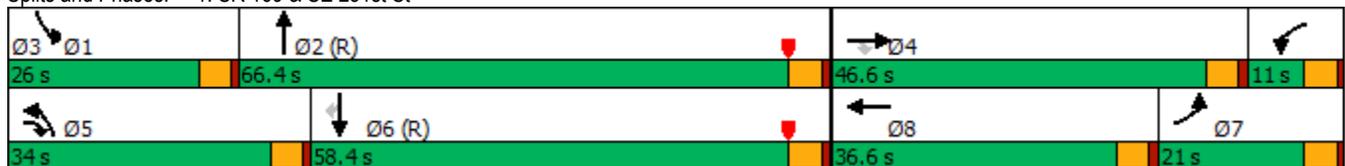
Actuated Cycle Length: 150

Offset: 4 (3%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow

Natural Cycle: 110

Control Type: Actuated-Coordinated

Splits and Phases: 1: SR 169 & SE 231st St



HCM 6th Signalized Intersection Summary

1: SR 169 & SE 231st St

08/31/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	135	212	804	25	87	55	602	503	15	61	1214	150
Future Volume (veh/h)	135	212	804	25	87	55	602	503	15	61	1214	150
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2166	2166	2166	2131	2131	2131	2166	2166	2166	2183	2183	2183
Adj Flow Rate, veh/h	147	230	828	27	95	60	654	547	16	66	1320	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	4	4	4	2	2	2	1	1	1
Cap, veh/h	272	489	1305	46	141	89	723	2381	70	90	1849	822
Arrive On Green	0.13	0.23	0.23	0.02	0.12	0.12	0.30	0.97	0.97	0.04	0.45	0.45
Sat Flow, veh/h	2063	2166	3194	2030	1214	767	4001	4082	119	2079	4147	1844
Grp Volume(v), veh/h	147	230	828	27	0	155	654	275	288	66	1320	3
Grp Sat Flow(s),veh/h/ln	2063	2166	1597	2030	0	1981	2001	2057	2144	2079	2074	1844
Q Serve(g_s), s	10.0	13.8	25.1	2.0	0.0	11.2	23.5	0.7	0.7	4.7	38.8	0.1
Cycle Q Clear(g_c), s	10.0	13.8	25.1	2.0	0.0	11.2	23.5	0.7	0.7	4.7	38.8	0.1
Prop In Lane	1.00		1.00	1.00		0.39	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	272	489	1305	46	0	230	723	1200	1251	90	1849	822
V/C Ratio(X)	0.54	0.47	0.63	0.59	0.00	0.67	0.90	0.23	0.23	0.74	0.71	0.00
Avail Cap(c_a), veh/h	272	606	1478	87	0	423	784	1200	1251	297	1849	822
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	0.00	1.00	0.93	0.93	0.93	1.00	1.00	1.00
Uniform Delay (d), s/veh	60.9	50.3	23.5	72.6	0.0	63.5	51.1	0.8	0.8	70.9	33.8	9.7
Incr Delay (d2), s/veh	2.8	1.0	0.9	16.1	0.0	4.8	12.9	0.4	0.4	15.3	2.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	7.6	9.6	1.2	0.0	6.0	12.0	0.4	0.4	2.9	20.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	63.7	51.3	24.5	88.7	0.0	68.3	64.0	1.2	1.2	86.2	36.2	9.7
LnGrp LOS	E	D	C	F	A	E	E	A	A	F	D	A
Approach Vol, veh/h		1205			182			1217			1389	
Approach Delay, s/veh		34.4			71.3			35.0			38.5	
Approach LOS		C			E			C			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.1	92.5	8.0	38.5	31.7	71.9	24.4	22.0				
Change Period (Y+Rc), s	4.6	5.0	4.6	4.6	4.6	5.0	4.6	4.6				
Max Green Setting (Gmax), s	21.4	61.4	6.4	42.0	29.4	53.4	16.4	32.0				
Max Q Clear Time (g_c+I1), s	6.7	2.7	4.0	27.1	25.5	40.8	12.0	13.2				
Green Ext Time (p_c), s	0.2	3.8	0.0	6.7	1.6	7.5	0.3	0.8				

Intersection Summary

HCM 6th Ctrl Delay	37.7
HCM 6th LOS	D

Lanes, Volumes, Timings
2: SE Wax Rd & SR 169

08/31/2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	20	443	40	25	45	291	964	25	45	1953	131
Future Volume (vph)	121	20	443	40	25	45	291	964	25	45	1953	131
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Storage Length (ft)	150		68	250		0	0		0	150		150
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			25			35			35	
Link Distance (ft)		755			389			480			655	
Travel Time (s)		14.7			10.6			9.4			12.8	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Detector Phase	4	4	4	8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		10.0	10.0		10.0	25.0	25.0
Minimum Split (s)	32.6	32.6	32.6	34.6	34.6		14.6	32.0		14.6	30.0	30.0
Total Split (s)	35.0	35.0	35.0	35.0	35.0		34.0	100.4		14.6	81.0	81.0
Total Split (%)	23.3%	23.3%	23.3%	23.3%	23.3%		22.7%	66.9%		9.7%	54.0%	54.0%
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	4.0		3.6	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	4.6	4.6	4.6		4.6	5.0		4.6	5.0	5.0
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	C-Min

Intersection Summary

Area Type: Other

Cycle Length: 150

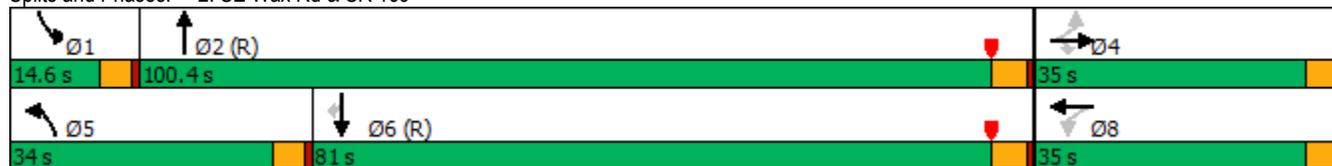
Actuated Cycle Length: 150

Offset: 12 (8%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow

Natural Cycle: 125

Control Type: Actuated-Coordinated

Splits and Phases: 2: SE Wax Rd & SR 169



HCM 6th Signalized Intersection Summary
2: SE Wax Rd & SR 169

08/31/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (veh/h)	121	20	443	40	25	45	291	964	25	45	1953	131	
Future Volume (veh/h)	121	20	443	40	25	45	291	964	25	45	1953	131	
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)	0.99		0.99	0.99		0.99	1.00		1.00	1.00		1.00	
Parking Bus, Adj	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00	
Work Zone On Approach		No			No			No			No		
Adj Sat Flow, veh/h/ln	2200	2200	2200	2200	2200	2200	2166	2166	2166	2183	2183	2183	
Adj Flow Rate, veh/h	130	22	139	43	27	48	313	1037	27	48	2100	141	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	
Percent Heavy Veh, %	0	0	0	0	0	0	2	2	2	1	1	1	
Cap, veh/h	209	340	285	228	109	194	343	2840	74	120	2424	1077	
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.17	0.69	0.69	0.12	1.00	1.00	
Sat Flow, veh/h	1335	2200	1846	1235	706	1254	2063	4097	107	2079	4147	1842	
Grp Volume(v), veh/h	130	22	139	43	0	75	313	521	543	48	2100	141	
Grp Sat Flow(s),veh/h/ln	1335	2200	1846	1235	0	1960	2063	2057	2146	2079	2074	1842	
Q Serve(g_s), s	14.2	1.3	10.3	4.6	0.0	5.0	22.4	15.6	15.6	3.2	0.0	0.0	
Cycle Q Clear(g_c), s	19.3	1.3	10.3	5.9	0.0	5.0	22.4	15.6	15.6	3.2	0.0	0.0	
Prop In Lane	1.00		1.00	1.00		0.64	1.00		0.05	1.00		1.00	
Lane Grp Cap(c), veh/h	209	340	285	228	0	303	343	1426	1487	120	2424	1077	
V/C Ratio(X)	0.62	0.06	0.49	0.19	0.00	0.25	0.91	0.37	0.37	0.40	0.87	0.13	
Avail Cap(c_a), veh/h	274	446	374	288	0	397	404	1426	1487	139	2424	1077	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	
Upstream Filter(l)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.64	0.64	0.64	
Uniform Delay (d), s/veh	64.2	54.1	58.0	56.7	0.0	55.7	61.5	9.5	9.5	63.9	0.0	0.0	
Incr Delay (d2), s/veh	3.0	0.1	1.3	0.4	0.0	0.4	22.6	0.7	0.7	1.4	2.9	0.2	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln	5.0	0.7	5.0	1.5	0.0	2.6	13.8	7.0	7.3	1.7	1.0	0.0	
Unsig. Movement Delay, s/veh													
LnGrp Delay(d),s/veh	67.2	54.2	59.3	57.1	0.0	56.2	84.1	10.2	10.2	65.3	2.9	0.2	
LnGrp LOS	E	D	E	E	A	E	F	B	B	E	A	A	
Approach Vol, veh/h		291			118			1377			2289		
Approach Delay, s/veh		62.4			56.5			27.0			4.1		
Approach LOS		E			E			C			A		
Timer - Assigned Phs	1	2		4	5	6		8					
Phs Duration (G+Y+Rc), s	13.2	109.0		27.8	29.5	92.7		27.8					
Change Period (Y+Rc), s	4.6	5.0		4.6	4.6	5.0		4.6					
Max Green Setting (Gmax), s	10.0	95.4		30.4	29.4	76.0		30.4					
Max Q Clear Time (g_c+I1), s	5.2	17.6		21.3	24.4	2.0		7.9					
Green Ext Time (p_c), s	0.0	14.7		0.8	0.6	56.1		0.4					
Intersection Summary													
HCM 6th Ctrl Delay				17.5									
HCM 6th LOS				B									

Lanes, Volumes, Timings
3: SR 169 & SE Witte Rd/Witte Rd SE

08/31/2020

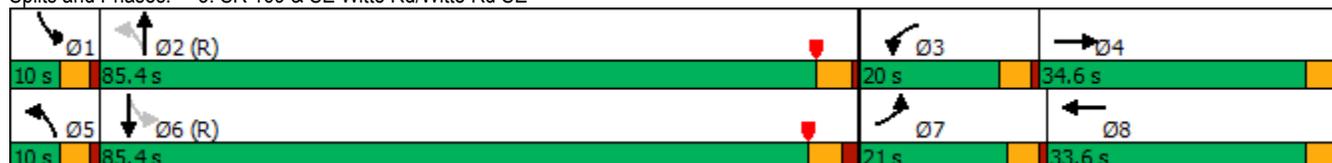


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	453	56	18	177	106	10	27	931	40	5	1599	826
Future Volume (vph)	453	56	18	177	106	10	27	931	40	5	1599	826
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Grade (%)		0%			-8%			-6%			4%	
Storage Length (ft)	130		0	180		0	300		200	150		0
Storage Lanes	2		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		971			453			1789			444	
Travel Time (s)		18.9			8.8			34.9			8.6	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	10.0	32.6		10.0	33.6		10.0	33.0		10.0	34.0	
Total Split (s)	21.0	34.6		20.0	33.6		10.0	85.4		10.0	85.4	
Total Split (%)	14.0%	23.1%		13.3%	22.4%		6.7%	56.9%		6.7%	56.9%	
Yellow Time (s)	3.5	3.6		3.5	3.6		3.5	4.0		3.5	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.6		4.5	4.6		4.5	5.0		4.5	6.0	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?	Yes	Yes										
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 33 (22%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow
 Natural Cycle: 150
 Control Type: Actuated-Coordinated

Splits and Phases: 3: SR 169 & SE Witte Rd/Witte Rd SE



HCM 6th Signalized Intersection Summary
 3: SR 169 & SE Witte Rd/Witte Rd SE

08/31/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↔		↔	↔		↔	↕↔		↔	↕↔	
Traffic Volume (veh/h)	453	56	18	177	106	10	27	931	40	5	1599	826
Future Volume (veh/h)	453	56	18	177	106	10	27	931	40	5	1599	826
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2200	2200	2200	2547	2547	2547	2456	2456	2456	2074	2074	2074
Adj Flow Rate, veh/h	472	58	19	184	110	10	28	970	42	5	1666	860
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	0	0	0	1	1	1	1	1	1	1	1	1
Cap, veh/h	447	171	56	215	199	18	102	3035	131	367	1683	797
Arrive On Green	0.11	0.11	0.11	0.09	0.09	0.09	0.02	0.67	0.67	0.01	0.65	0.65
Sat Flow, veh/h	4065	1580	518	2426	2296	209	2339	4555	197	1975	2591	1226
Grp Volume(v), veh/h	472	0	77	184	0	120	28	497	515	5	1231	1295
Grp Sat Flow(s),veh/h/ln	2032	0	2098	2426	0	2505	2339	2333	2419	1975	1970	1847
Q Serve(g_s), s	16.5	0.0	5.1	11.2	0.0	6.9	0.6	13.5	13.5	0.1	87.5	97.4
Cycle Q Clear(g_c), s	16.5	0.0	5.1	11.2	0.0	6.9	0.6	13.5	13.5	0.1	87.5	97.4
Prop In Lane	1.00		0.25	1.00		0.08	1.00		0.08	1.00		0.66
Lane Grp Cap(c), veh/h	447	0	227	215	0	217	102	1554	1612	367	1280	1200
V/C Ratio(X)	1.06	0.00	0.34	0.85	0.00	0.55	0.28	0.32	0.32	0.01	0.96	1.08
Avail Cap(c_a), veh/h	447	0	420	251	0	484	134	1554	1612	427	1280	1200
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	0.00	1.00	0.85	0.85	0.85	1.00	1.00	1.00
Uniform Delay (d), s/veh	66.8	0.0	61.9	67.4	0.0	65.7	39.8	10.6	10.6	9.3	24.5	26.3
Incr Delay (d2), s/veh	58.0	0.0	0.9	20.6	0.0	2.2	0.9	0.5	0.4	0.0	17.5	50.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.1	0.0	2.8	8.2	0.0	4.5	0.7	7.0	7.3	0.1	43.9	56.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	124.8	0.0	62.8	88.0	0.0	67.9	40.7	11.1	11.1	9.3	42.1	76.6
LnGrp LOS	F	A	E	F	A	E	D	B	B	A	D	F
Approach Vol, veh/h		549			304			1040			2531	
Approach Delay, s/veh		116.1			80.1			11.9			59.6	
Approach LOS		F			F			B			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	5.4	105.9	17.8	20.8	7.9	103.4	21.0	17.6				
Change Period (Y+Rc), s	4.5	* 6	4.5	4.6	4.5	6.0	4.5	4.6				
Max Green Setting (Gmax), s	5.5	* 80	15.5	30.0	5.5	79.4	16.5	29.0				
Max Q Clear Time (g_c+I1), s	2.1	15.5	13.2	7.1	2.6	99.4	18.5	8.9				
Green Ext Time (p_c), s	0.0	13.3	0.1	0.2	0.0	0.0	0.0	0.3				

Intersection Summary

HCM 6th Ctrl Delay	56.8
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings
4: SR 169 & SE 240th St

08/31/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	66	95	159	142	94	93	115	852	135	144	1559	45
Future Volume (vph)	66	95	159	142	94	93	115	852	135	144	1559	45
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Storage Length (ft)	0		180	200		0	300		130	380		150
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		345			804			1369			1789	
Travel Time (s)		7.8			18.3			26.7			34.9	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA										
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	10.0	29.5		10.0	30.5		10.0	29.5		10.0	29.0	
Total Split (s)	15.0	32.0		29.0	46.0		18.0	71.0		18.0	71.0	
Total Split (%)	10.0%	21.3%		19.3%	30.7%		12.0%	47.3%		12.0%	47.3%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	4.5		3.5	4.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	5.5		4.5	5.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes										
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	

Intersection Summary

Area Type: Other

Cycle Length: 150

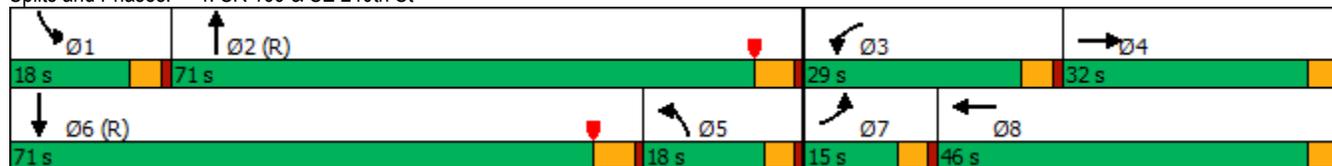
Actuated Cycle Length: 150

Offset: 93 (62%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow

Natural Cycle: 90

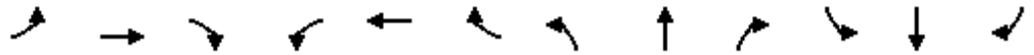
Control Type: Actuated-Coordinated

Splits and Phases: 4: SR 169 & SE 240th St



HCM 6th Signalized Intersection Summary
 4: SR 169 & SE 240th St

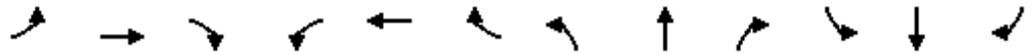
08/31/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	66	95	159	142	94	93	115	852	135	144	1559	45
Future Volume (veh/h)	66	95	159	142	94	93	115	852	135	144	1559	45
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2200	2200	2200	2183	2183	2183	2183	2183	2183	2183	2183	2183
Adj Flow Rate, veh/h	70	101	169	151	100	99	122	906	144	153	1659	48
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	0	0	0	1	1	1	1	1	1	1	1	1
Cap, veh/h	93	113	190	181	198	196	396	1953	310	180	1788	52
Arrive On Green	0.04	0.15	0.15	0.09	0.20	0.20	0.19	0.55	0.55	0.03	0.14	0.14
Sat Flow, veh/h	2095	735	1230	2079	1003	993	2079	3582	569	2079	4116	119
Grp Volume(v), veh/h	70	0	270	151	0	199	122	524	526	153	833	874
Grp Sat Flow(s),veh/h/ln	2095	0	1964	2079	0	1995	2079	2074	2077	2079	2074	2161
Q Serve(g_s), s	5.0	0.0	20.2	10.7	0.0	13.3	7.6	23.1	23.1	11.0	59.5	59.9
Cycle Q Clear(g_c), s	5.0	0.0	20.2	10.7	0.0	13.3	7.6	23.1	23.1	11.0	59.5	59.9
Prop In Lane	1.00		0.63	1.00		0.50	1.00		0.27	1.00		0.05
Lane Grp Cap(c), veh/h	93	0	303	181	0	394	396	1130	1132	180	901	939
V/C Ratio(X)	0.76	0.00	0.89	0.83	0.00	0.51	0.31	0.46	0.46	0.85	0.92	0.93
Avail Cap(c_a), veh/h	147	0	360	340	0	552	396	1130	1132	187	906	943
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(l)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.09	0.09	0.09
Uniform Delay (d), s/veh	70.9	0.0	62.2	67.4	0.0	53.7	52.2	20.8	20.8	71.9	61.8	62.0
Incr Delay (d2), s/veh	11.8	0.0	20.6	9.5	0.0	1.0	0.4	1.4	1.4	3.5	2.1	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	0.0	11.9	6.2	0.0	6.9	4.0	11.6	11.6	6.3	33.9	35.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	82.7	0.0	82.8	76.9	0.0	54.7	52.6	22.1	22.1	75.3	63.9	64.2
LnGrp LOS	F	A	F	E	A	D	D	C	C	E	E	E
Approach Vol, veh/h		340			350			1172			1860	
Approach Delay, s/veh		82.8			64.3			25.3			65.0	
Approach LOS		F			E			C			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.5	87.3	17.6	27.7	34.1	70.7	11.1	34.1				
Change Period (Y+Rc), s	4.5	5.5	4.5	4.5	5.5	* 5.5	4.5	4.5				
Max Green Setting (Gmax), s	13.5	65.5	24.5	27.5	13.5	* 66	10.5	41.5				
Max Q Clear Time (g_c+I1), s	13.0	25.1	12.7	22.2	9.6	61.9	7.0	15.3				
Green Ext Time (p_c), s	0.0	13.0	0.4	0.5	0.1	3.2	0.0	0.8				
Intersection Summary												
HCM 6th Ctrl Delay			54.0									
HCM 6th LOS			D									
Notes												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												

Lanes, Volumes, Timings
5: SE 240th St & SE 228th St

08/31/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	66	126	14	1	112	1	119	40	18	1	45	31
Future Volume (vph)	66	126	14	1	112	1	119	40	18	1	45	31
Ideal Flow (vphpl)	1900	1900	2200	2200	1900	1900	2200	2200	2200	1900	2200	1900
Storage Length (ft)	150		150	150		150	0		0	150		150
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		30			30			30				30
Link Distance (ft)		804			666			190				594
Travel Time (s)		18.3			15.1			4.3				13.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)												
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary

Area Type: Other
Control Type: Roundabout

HCM 6th Roundabout
5: SE 240th St & SE 228th St

08/31/2020

Intersection				
Intersection Delay, s/veh	4.5			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	224	124	192	84
Demand Flow Rate, veh/h	228	126	196	86
Vehicles Circulating, veh/h	52	249	214	257
Vehicles Exiting, veh/h	291	161	66	118
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.3	4.5	4.9	4.2
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	228	126	196	86
Cap Entry Lane, veh/h	1309	1070	1109	1062
Entry HV Adj Factor	0.984	0.981	0.980	0.977
Flow Entry, veh/h	224	124	192	84
Cap Entry, veh/h	1287	1050	1087	1037
V/C Ratio	0.174	0.118	0.177	0.081
Control Delay, s/veh	4.3	4.5	4.9	4.2
LOS	A	A	A	A
95th %tile Queue, veh	1	0	1	0

Lanes, Volumes, Timings
6: Witte Rd SE & SE 231st St

08/31/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	40	0	0	35	15	0	77	0	10	124	152
Future Volume (vph)	51	40	0	0	35	15	0	77	0	10	124	152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			0%			9%	
Storage Length (ft)	150		150	150		150	0		0	150		150
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		35			35			35				35
Link Distance (ft)		323			286			358				239
Travel Time (s)		6.3			5.6			7.0				4.7
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	0%	0%	0%	1%	1%	1%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection												
Int Delay, s/veh	10											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	51	40	0	0	35	15	0	77	0	10	124	152
Future Vol, veh/h	51	40	0	0	35	15	0	77	0	10	124	152
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	9	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	1	1	1	2	2	2	0	0	0	1	1	1
Mvmt Flow	58	45	0	0	40	17	0	88	0	11	141	173

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	57	0	0	45	0	0	367	218	45	254	210	49
Stage 1	-	-	-	-	-	-	161	161	-	49	49	-
Stage 2	-	-	-	-	-	-	206	57	-	205	161	-
Critical Hdwy	4.11	-	-	4.12	-	-	7.1	6.5	6.2	8.91	8.31	7.11
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	7.91	7.31	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	7.91	7.31	-
Follow-up Hdwy	2.209	-	-	2.218	-	-	3.5	4	3.3	3.509	4.009	3.309
Pot Cap-1 Maneuver	1554	-	-	1563	-	-	593	684	1031	618	620	1010
Stage 1	-	-	-	-	-	-	846	769	-	943	835	-
Stage 2	-	-	-	-	-	-	801	851	-	721	707	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1554	-	-	1563	-	-	391	658	1031	540	596	1010
Mov Cap-2 Maneuver	-	-	-	-	-	-	391	658	-	540	596	-
Stage 1	-	-	-	-	-	-	814	740	-	907	835	-
Stage 2	-	-	-	-	-	-	552	851	-	612	680	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	4.2			0			11.3			13.3		
HCM LOS							B			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	658	1554	-	-	1563	-	-	758
HCM Lane V/C Ratio	0.133	0.037	-	-	-	-	-	0.429
HCM Control Delay (s)	11.3	7.4	0	-	0	-	-	13.3
HCM Lane LOS	B	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	0.5	0.1	-	-	0	-	-	2.2

Lanes, Volumes, Timings
 3: SR 169 & SE Witte Rd/Witte Rd SE

08/31/2020

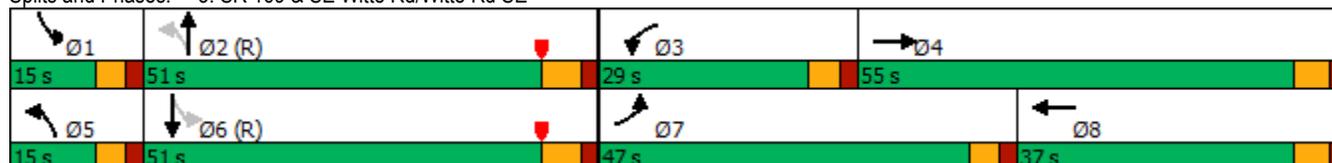


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	885	33	8	16	9	0	5	1355	55	10	577	266
Future Volume (vph)	885	33	8	16	9	0	5	1355	55	10	577	266
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Grade (%)		0%			-8%			-6%			4%	
Storage Length (ft)	130		0	180		0	300		200	150		0
Storage Lanes	2		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		971			378			1789			444	
Travel Time (s)		18.9			7.4			34.9			8.6	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	1%	1%	1%	9%	9%	9%	5%	5%	5%	9%	9%	9%
Shared Lane Traffic (%)												
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	10.5	34.0		10.5	37.0		10.5	33.3		10.5	36.3	
Total Split (s)	47.0	55.0		29.0	37.0		15.0	51.0		15.0	51.0	
Total Split (%)	31.3%	36.7%		19.3%	24.7%		10.0%	34.0%		10.0%	34.0%	
Yellow Time (s)	3.5	4.0		3.5	4.0		3.5	4.3		3.5	4.3	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	6.0		5.5	6.0		5.5	6.3		5.5	6.3	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?	Yes	Yes										
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 45 (30%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow
 Natural Cycle: 145
 Control Type: Actuated-Coordinated

Splits and Phases: 3: SR 169 & SE Witte Rd/Witte Rd SE



HCM 6th Signalized Intersection Summary
 3: SR 169 & SE Witte Rd/Witte Rd SE

08/31/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	885	33	8	16	9	0	5	1355	55	10	577	266
Future Volume (veh/h)	885	33	8	16	9	0	5	1355	55	10	577	266
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2183	2183	2183	2408	2408	2408	2386	2386	2386	1936	1936	1936
Adj Flow Rate, veh/h	912	34	8	16	9	0	5	1397	57	10	595	274
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	1	1	1	9	9	9	5	5	5	9	9	9
Cap, veh/h	1007	509	120	37	156	0	322	2302	94	166	1280	589
Arrive On Green	0.25	0.30	0.30	0.02	0.06	0.00	0.01	0.52	0.52	0.01	0.52	0.52
Sat Flow, veh/h	4033	1707	402	2293	2408	0	2273	4439	181	1844	2443	1124
Grp Volume(v), veh/h	912	0	42	16	9	0	5	712	742	10	448	421
Grp Sat Flow(s),veh/h/ln	2017	0	2108	2293	2408	0	2273	2267	2353	1844	1840	1728
Q Serve(g_s), s	32.9	0.0	2.1	1.0	0.5	0.0	0.2	33.1	33.2	0.4	23.0	23.0
Cycle Q Clear(g_c), s	32.9	0.0	2.1	1.0	0.5	0.0	0.2	33.1	33.2	0.4	23.0	23.0
Prop In Lane	1.00		0.19	1.00		0.00	1.00		0.08	1.00		0.65
Lane Grp Cap(c), veh/h	1007	0	629	37	156	0	322	1176	1220	166	963	905
V/C Ratio(X)	0.91	0.00	0.07	0.43	0.06	0.00	0.02	0.61	0.61	0.06	0.46	0.47
Avail Cap(c_a), veh/h	1116	0	689	359	498	0	452	1176	1220	262	963	905
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.5	0.0	37.7	73.1	65.8	0.0	18.6	25.3	25.4	20.5	22.5	22.5
Incr Delay (d2), s/veh	9.9	0.0	0.0	5.7	0.2	0.0	0.0	2.3	2.3	0.2	1.6	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	18.0	0.0	1.1	0.7	0.3	0.0	0.1	18.4	19.1	0.2	10.3	9.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	64.4	0.0	37.7	78.8	66.0	0.0	18.6	27.7	27.6	20.6	24.1	24.2
LnGrp LOS	E	A	D	E	E	A	B	C	C	C	C	C
Approach Vol, veh/h		954			25			1459			879	
Approach Delay, s/veh		63.3			74.2			27.6			24.1	
Approach LOS		E			E			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.2	84.1	7.9	50.8	6.4	84.9	43.0	15.7				
Change Period (Y+Rc), s	5.5	6.3	5.5	6.0	5.5	6.3	5.5	6.0				
Max Green Setting (Gmax), s	9.5	44.7	23.5	49.0	9.5	44.7	41.5	31.0				
Max Q Clear Time (g_c+I1), s	2.4	35.2	3.0	4.1	2.2	25.0	34.9	2.5				
Green Ext Time (p_c), s	0.0	7.4	0.0	0.1	0.0	7.8	2.6	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			37.3									
HCM 6th LOS			D									

Lanes, Volumes, Timings
1: SR 169 & SE 231st St

08/31/2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	135	223	804	28	102	64	602	503	17	67	1214	150
Future Volume (vph)	135	223	804	28	102	64	602	503	17	67	1214	150
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Storage Length (ft)	250		0	0		170	300		0	150		150
Storage Lanes	1		2	1		1	2		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		693			553			655			674	
Travel Time (s)		13.5			10.8			12.8			13.1	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA	pm+ov	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases			4									6
Detector Phase	7	4	4 5	3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	10.0	34.6	10.0	10.0	36.6		10.0	33.0		10.0	33.0	33.0
Total Split (s)	21.0	46.6	34.0	11.0	36.6		34.0	66.4		26.0	58.4	58.4
Total Split (%)	14.0%	31.1%	22.7%	7.3%	24.4%		22.7%	44.3%		17.3%	38.9%	38.9%
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	4.0		3.6	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	4.6	4.6	4.6		4.6	5.0		4.6	5.0	5.0
Lead/Lag	Lag	Lead	Lead	Lag	Lead		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	C-Min

Intersection Summary

Area Type: Other

Cycle Length: 150

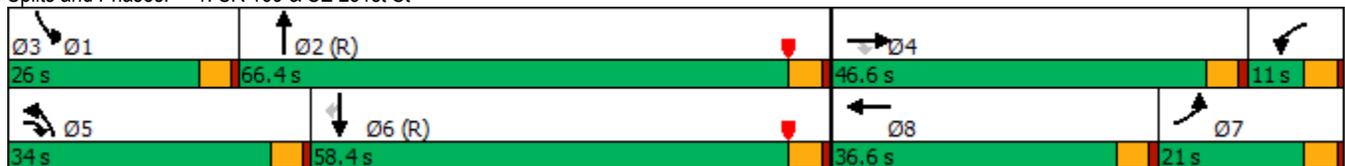
Actuated Cycle Length: 150

Offset: 4 (3%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow

Natural Cycle: 110

Control Type: Actuated-Coordinated

Splits and Phases: 1: SR 169 & SE 231st St



HCM 6th Signalized Intersection Summary

1: SR 169 & SE 231st St

08/31/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	135	223	804	28	102	64	602	503	17	67	1214	150
Future Volume (veh/h)	135	223	804	28	102	64	602	503	17	67	1214	150
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2166	2166	2166	2131	2131	2131	2166	2166	2166	2183	2183	2183
Adj Flow Rate, veh/h	147	242	833	30	111	70	654	547	18	73	1320	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	4	4	4	2	2	2	1	1	1
Cap, veh/h	254	491	1308	48	155	98	723	2345	77	98	1839	817
Arrive On Green	0.12	0.23	0.23	0.02	0.13	0.13	0.30	0.96	0.96	0.05	0.44	0.44
Sat Flow, veh/h	2063	2166	3195	2030	1216	767	4001	4065	134	2079	4147	1844
Grp Volume(v), veh/h	147	242	833	30	0	181	654	277	288	73	1320	3
Grp Sat Flow(s),veh/h/ln	2063	2166	1597	2030	0	1983	2001	2057	2141	2079	2074	1844
Q Serve(g_s), s	10.1	14.6	25.2	2.2	0.0	13.2	23.5	0.9	0.9	5.2	39.0	0.1
Cycle Q Clear(g_c), s	10.1	14.6	25.2	2.2	0.0	13.2	23.5	0.9	0.9	5.2	39.0	0.1
Prop In Lane	1.00		1.00	1.00		0.39	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	254	491	1308	48	0	252	723	1187	1235	98	1839	817
V/C Ratio(X)	0.58	0.49	0.64	0.62	0.00	0.72	0.90	0.23	0.23	0.74	0.72	0.00
Avail Cap(c_a), veh/h	254	606	1478	87	0	423	784	1187	1235	297	1839	817
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	0.00	1.00	0.93	0.93	0.93	1.00	1.00	1.00
Uniform Delay (d), s/veh	62.1	50.5	23.4	72.5	0.0	62.9	51.1	1.2	1.2	70.6	34.1	10.2
Incr Delay (d2), s/veh	4.0	1.1	0.9	17.1	0.0	5.4	12.9	0.4	0.4	14.6	2.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.6	8.1	9.6	1.4	0.0	7.0	12.0	0.5	0.5	3.2	20.1	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.0	51.6	24.3	89.7	0.0	68.2	64.0	1.6	1.6	85.2	36.5	10.3
LnGrp LOS	E	D	C	F	A	E	E	A	A	F	D	B
Approach Vol, veh/h		1222			211			1219			1396	
Approach Delay, s/veh		34.7			71.3			35.1			39.0	
Approach LOS		C			E			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.7	91.6	8.2	38.6	31.7	71.5	23.1	23.7				
Change Period (Y+Rc), s	4.6	5.0	4.6	4.6	4.6	5.0	4.6	4.6				
Max Green Setting (Gmax), s	21.4	61.4	6.4	42.0	29.4	53.4	16.4	32.0				
Max Q Clear Time (g_c+I1), s	7.2	2.9	4.2	27.2	25.5	41.0	12.1	15.2				
Green Ext Time (p_c), s	0.2	3.8	0.0	6.8	1.6	7.4	0.2	0.9				
Intersection Summary												
HCM 6th Ctrl Delay			38.2									
HCM 6th LOS			D									

Lanes, Volumes, Timings
2: SE Wax Rd & SR 169

08/31/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	123	20	446	40	25	45	297	964	25	45	1953	134
Future Volume (vph)	123	20	446	40	25	45	297	964	25	45	1953	134
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Storage Length (ft)	150		68	250		0	0		0	150		150
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			25			35			35	
Link Distance (ft)		755			389			480			655	
Travel Time (s)		14.7			10.6			9.4			12.8	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Detector Phase	4	4	4	8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		10.0	10.0		10.0	25.0	25.0
Minimum Split (s)	32.6	32.6	32.6	34.6	34.6		14.6	32.0		14.6	30.0	30.0
Total Split (s)	35.0	35.0	35.0	35.0	35.0		34.0	100.4		14.6	81.0	81.0
Total Split (%)	23.3%	23.3%	23.3%	23.3%	23.3%		22.7%	66.9%		9.7%	54.0%	54.0%
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	4.0		3.6	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	4.6	4.6	4.6		4.6	5.0		4.6	5.0	5.0
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	C-Min

Intersection Summary

Area Type: Other

Cycle Length: 150

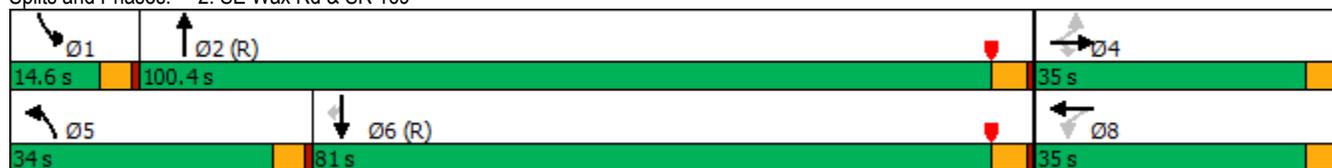
Actuated Cycle Length: 150

Offset: 12 (8%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow

Natural Cycle: 125

Control Type: Actuated-Coordinated

Splits and Phases: 2: SE Wax Rd & SR 169



HCM 6th Signalized Intersection Summary
 2: SE Wax Rd & SR 169

08/31/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	123	20	446	40	25	45	297	964	25	45	1953	134
Future Volume (veh/h)	123	20	446	40	25	45	297	964	25	45	1953	134
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	0.99		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2200	2200	2200	2200	2200	2200	2166	2166	2166	2183	2183	2183
Adj Flow Rate, veh/h	132	22	137	43	27	48	319	1037	27	48	2100	144
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	0	0	0	0	0	0	2	2	2	1	1	1
Cap, veh/h	211	342	287	230	110	195	348	2835	74	120	2409	1070
Arrive On Green	0.16	0.16	0.16	0.16	0.16	0.16	0.17	0.69	0.69	0.12	1.00	1.00
Sat Flow, veh/h	1335	2200	1846	1237	706	1254	2063	4097	107	2079	4147	1842
Grp Volume(v), veh/h	132	22	137	43	0	75	319	521	543	48	2100	144
Grp Sat Flow(s),veh/h/ln	1335	2200	1846	1237	0	1960	2063	2057	2146	2079	2074	1842
Q Serve(g_s), s	14.4	1.3	10.2	4.6	0.0	5.0	22.8	15.7	15.7	3.2	0.0	0.0
Cycle Q Clear(g_c), s	19.5	1.3	10.2	5.9	0.0	5.0	22.8	15.7	15.7	3.2	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.64	1.00		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	211	342	287	230	0	305	348	1424	1485	120	2409	1070
V/C Ratio(X)	0.63	0.06	0.48	0.19	0.00	0.25	0.92	0.37	0.37	0.40	0.87	0.13
Avail Cap(c_a), veh/h	274	446	374	288	0	397	404	1424	1485	139	2409	1070
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.64	0.64	0.64
Uniform Delay (d), s/veh	64.2	54.0	57.8	56.5	0.0	55.6	61.3	9.5	9.5	63.9	0.0	0.0
Incr Delay (d2), s/veh	3.0	0.1	1.2	0.4	0.0	0.4	23.3	0.7	0.7	1.4	3.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	0.7	4.9	1.5	0.0	2.6	14.1	7.1	7.3	1.7	1.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.2	54.1	59.0	56.9	0.0	56.0	84.5	10.3	10.2	65.3	3.1	0.2
LnGrp LOS	E	D	E	E	A	E	F	B	B	E	A	A
Approach Vol, veh/h		291			118			1383			2292	
Approach Delay, s/veh		62.3			56.3			27.4			4.2	
Approach LOS		E			E			C			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.2	108.8		27.9	29.9	92.1		27.9				
Change Period (Y+Rc), s	4.6	5.0		4.6	4.6	5.0		4.6				
Max Green Setting (Gmax), s	10.0	95.4		30.4	29.4	76.0		30.4				
Max Q Clear Time (g_c+I1), s	5.2	17.7		21.5	24.8	2.0		7.9				
Green Ext Time (p_c), s	0.0	14.7		0.8	0.5	56.2		0.4				

Intersection Summary

HCM 6th Ctrl Delay	17.7
HCM 6th LOS	B

Lanes, Volumes, Timings
3: SR 169 & SE Witte Rd/Witte Rd SE

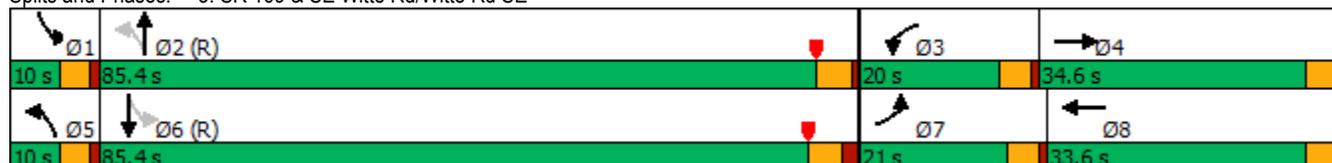
08/31/2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	453	65	18	215	117	16	27	931	62	8	1599	826
Future Volume (vph)	453	65	18	215	117	16	27	931	62	8	1599	826
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Grade (%)		0%			-8%			-6%			4%	
Storage Length (ft)	130		0	180		0	300		200	150		0
Storage Lanes	2		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		971			378			1789			444	
Travel Time (s)		18.9			7.4			34.9			8.6	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	10.0	32.6		10.0	33.6		10.0	33.0		10.0	34.0	
Total Split (s)	21.0	34.6		20.0	33.6		10.0	85.4		10.0	85.4	
Total Split (%)	14.0%	23.1%		13.3%	22.4%		6.7%	56.9%		6.7%	56.9%	
Yellow Time (s)	3.5	3.6		3.5	3.6		3.5	4.0		3.5	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.6		4.5	4.6		4.5	5.0		4.5	6.0	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?	Yes	Yes										
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 33 (22%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow
 Natural Cycle: 150
 Control Type: Actuated-Coordinated

Splits and Phases: 3: SR 169 & SE Witte Rd/Witte Rd SE



HCM 6th Signalized Intersection Summary
 3: SR 169 & SE Witte Rd/Witte Rd SE

08/31/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	453	65	18	215	117	16	27	931	62	8	1599	826
Future Volume (veh/h)	453	65	18	215	117	16	27	931	62	8	1599	826
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2200	2200	2200	2547	2547	2547	2456	2456	2456	2074	2074	2074
Adj Flow Rate, veh/h	472	68	19	224	122	17	28	970	65	8	1666	860
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	0	0	0	1	1	1	1	1	1	1	1	1
Cap, veh/h	447	165	46	251	204	28	102	2913	195	359	1666	789
Arrive On Green	0.11	0.10	0.10	0.10	0.09	0.09	0.02	0.66	0.66	0.01	0.64	0.64
Sat Flow, veh/h	4065	1648	461	2426	2182	304	2339	4437	297	1975	2591	1226
Grp Volume(v), veh/h	472	0	87	224	0	139	28	510	525	8	1231	1295
Grp Sat Flow(s),veh/h/ln	2032	0	2109	2426	0	2486	2339	2333	2401	1975	1970	1847
Q Serve(g_s), s	16.5	0.0	5.8	13.7	0.0	8.1	0.6	14.4	14.4	0.2	89.1	96.4
Cycle Q Clear(g_c), s	16.5	0.0	5.8	13.7	0.0	8.1	0.6	14.4	14.4	0.2	89.1	96.4
Prop In Lane	1.00		0.22	1.00		0.12	1.00		0.12	1.00		0.66
Lane Grp Cap(c), veh/h	447	0	211	251	0	232	102	1532	1576	359	1267	1188
V/C Ratio(X)	1.06	0.00	0.41	0.89	0.00	0.60	0.28	0.33	0.33	0.02	0.97	1.09
Avail Cap(c_a), veh/h	447	0	422	251	0	481	134	1532	1576	413	1267	1188
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	0.00	1.00	0.84	0.84	0.84	1.00	1.00	1.00
Uniform Delay (d), s/veh	66.8	0.0	63.4	66.4	0.0	65.3	39.5	11.3	11.3	9.6	25.5	26.8
Incr Delay (d2), s/veh	58.0	0.0	1.3	30.3	0.0	2.5	0.9	0.5	0.5	0.0	19.3	54.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.1	0.0	3.2	10.6	0.0	5.3	0.7	7.5	7.7	0.1	45.4	57.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	124.8	0.0	64.6	96.8	0.0	67.8	40.4	11.8	11.8	9.6	44.8	81.2
LnGrp LOS	F	A	E	F	A	E	D	B	B	A	D	F
Approach Vol, veh/h		559			363			1063			2534	
Approach Delay, s/veh		115.4			85.7			12.6			63.3	
Approach LOS		F			F			B			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	5.9	104.5	20.0	19.6	7.9	102.4	21.0	18.6				
Change Period (Y+Rc), s	4.5	* 6	4.5	4.6	4.5	6.0	4.5	4.6				
Max Green Setting (Gmax), s	5.5	* 80	15.5	30.0	5.5	79.4	16.5	29.0				
Max Q Clear Time (g_c+I1), s	2.2	16.4	15.7	7.8	2.6	98.4	18.5	10.1				
Green Ext Time (p_c), s	0.0	13.8	0.0	0.2	0.0	0.0	0.0	0.4				

Intersection Summary

HCM 6th Ctrl Delay	59.6
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings
4: SR 169 & SE 240th St

08/31/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	95	159	142	94	93	115	872	135	148	1589	49
Future Volume (vph)	68	95	159	142	94	93	115	872	135	148	1589	49
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Storage Length (ft)	0		180	200		0	300		130	380		150
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		345			804			1369			1789	
Travel Time (s)		7.8			18.3			26.7			34.9	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA										
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	10.0	29.5		10.0	30.5		10.0	29.5		10.0	29.0	
Total Split (s)	15.0	32.0		29.0	46.0		18.0	71.0		18.0	71.0	
Total Split (%)	10.0%	21.3%		19.3%	30.7%		12.0%	47.3%		12.0%	47.3%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	4.5		3.5	4.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	5.5		4.5	5.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes										
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	

Intersection Summary

Area Type: Other

Cycle Length: 150

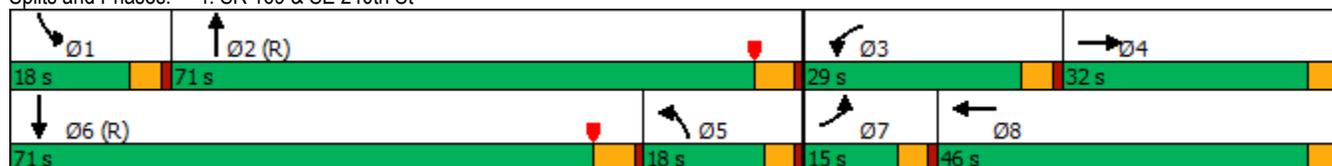
Actuated Cycle Length: 150

Offset: 93 (62%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow

Natural Cycle: 100

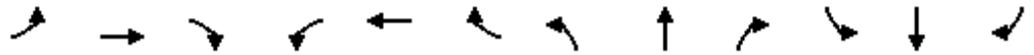
Control Type: Actuated-Coordinated

Splits and Phases: 4: SR 169 & SE 240th St



HCM 6th Signalized Intersection Summary
 4: SR 169 & SE 240th St

08/31/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	95	159	142	94	93	115	872	135	148	1589	49
Future Volume (veh/h)	68	95	159	142	94	93	115	872	135	148	1589	49
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2200	2200	2200	2183	2183	2183	2183	2183	2183	2183	2183	2183
Adj Flow Rate, veh/h	72	101	169	151	100	99	122	928	144	157	1690	52
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	0	0	0	1	1	1	1	1	1	1	1	1
Cap, veh/h	95	113	190	181	197	195	394	1953	303	184	1789	55
Arrive On Green	0.05	0.15	0.15	0.09	0.20	0.20	0.19	0.54	0.54	0.03	0.14	0.14
Sat Flow, veh/h	2095	735	1230	2079	1003	993	2079	3595	558	2079	4107	126
Grp Volume(v), veh/h	72	0	270	151	0	199	122	535	537	157	850	892
Grp Sat Flow(s),veh/h/ln	2095	0	1964	2079	0	1995	2079	2074	2079	2079	2074	2159
Q Serve(g_s), s	5.1	0.0	20.2	10.7	0.0	13.4	7.6	23.8	23.8	11.3	60.9	61.4
Cycle Q Clear(g_c), s	5.1	0.0	20.2	10.7	0.0	13.4	7.6	23.8	23.8	11.3	60.9	61.4
Prop In Lane	1.00		0.63	1.00		0.50	1.00		0.27	1.00		0.06
Lane Grp Cap(c), veh/h	95	0	303	181	0	392	394	1127	1130	184	903	941
V/C Ratio(X)	0.76	0.00	0.89	0.83	0.00	0.51	0.31	0.47	0.48	0.85	0.94	0.95
Avail Cap(c_a), veh/h	147	0	360	340	0	552	394	1127	1130	187	906	943
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(l)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.09	0.09	0.09
Uniform Delay (d), s/veh	70.8	0.0	62.2	67.4	0.0	53.8	52.3	21.1	21.1	71.8	62.3	62.5
Incr Delay (d2), s/veh	11.7	0.0	20.6	9.5	0.0	1.0	0.4	1.4	1.4	3.6	2.6	2.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	0.0	11.9	6.2	0.0	6.9	4.0	11.9	12.0	6.5	34.8	36.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	82.5	0.0	82.8	76.9	0.0	54.8	52.8	22.5	22.5	75.5	64.9	65.3
LnGrp LOS	F	A	F	E	A	D	D	C	C	E	E	E
Approach Vol, veh/h		342			350			1194			1899	
Approach Delay, s/veh		82.7			64.3			25.6			66.0	
Approach LOS		F			E			C			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.8	87.0	17.6	27.7	33.9	70.8	11.3	33.9				
Change Period (Y+Rc), s	4.5	5.5	4.5	4.5	5.5	* 5.5	4.5	4.5				
Max Green Setting (Gmax), s	13.5	65.5	24.5	27.5	13.5	* 66	10.5	41.5				
Max Q Clear Time (g_c+I1), s	13.3	25.8	12.7	22.2	9.6	63.4	7.1	15.4				
Green Ext Time (p_c), s	0.0	13.3	0.4	0.5	0.1	2.0	0.0	0.8				

Intersection Summary

HCM 6th Ctrl Delay	54.6
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings
5: SE 240th St & SE 228th St

08/31/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	66	130	14	1	112	1	119	40	18	1	45	31
Future Volume (vph)	66	130	14	1	112	1	119	40	18	1	45	31
Ideal Flow (vphpl)	1900	1900	2200	2200	1900	1900	2200	2200	2200	1900	2200	1900
Storage Length (ft)	150		150	150		150	0		0	150		150
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		30			30			30				30
Link Distance (ft)		804			666			190				615
Travel Time (s)		18.3			15.1			4.3				14.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)												
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary

Area Type: Other
Control Type: Roundabout

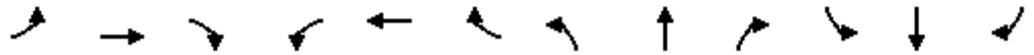
HCM 6th Roundabout
5: SE 240th St & SE 228th St

08/31/2020

Intersection				
Intersection Delay, s/veh	4.5			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	228	124	192	84
Demand Flow Rate, veh/h	232	126	196	86
Vehicles Circulating, veh/h	52	249	218	257
Vehicles Exiting, veh/h	291	165	66	118
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.3	4.5	4.9	4.2
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	232	126	196	86
Cap Entry Lane, veh/h	1309	1070	1105	1062
Entry HV Adj Factor	0.984	0.981	0.980	0.977
Flow Entry, veh/h	228	124	192	84
Cap Entry, veh/h	1287	1050	1083	1037
V/C Ratio	0.177	0.118	0.177	0.081
Control Delay, s/veh	4.3	4.5	4.9	4.2
LOS	A	A	A	A
95th %tile Queue, veh	1	0	1	0

Lanes, Volumes, Timings
6: SE 231st St & Witte Rd SE

08/31/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	40	22	0	35	15	35	96	0	10	137	158
Future Volume (vph)	59	40	22	0	35	15	35	96	0	10	137	158
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			0%			9%	
Storage Length (ft)	150		150	150		150	50		0	150		150
Storage Lanes	0		0	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		35			35			35				35
Link Distance (ft)		383			286			278				239
Travel Time (s)		7.5			5.6			5.4				4.7
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	3%	0%	0%	1%	1%	1%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection												
Int Delay, s/veh	4.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↘			↕	
Traffic Vol, veh/h	59	40	22	0	35	15	35	96	0	10	137	158
Future Vol, veh/h	59	40	22	0	35	15	35	96	0	10	137	158
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	50	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	9	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	1	1	1	2	2	2	3	0	0	1	1	1
Mvmt Flow	67	45	25	0	40	17	40	109	0	11	156	180

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	486	457	246	492	547	109	336	0	0	109	0	0
Stage 1	268	268	-	189	189	-	-	-	-	-	-	-
Stage 2	218	189	-	303	358	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.12	6.52	6.22	4.13	-	-	4.11	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.518	4.018	3.318	2.227	-	-	2.209	-	-
Pot Cap-1 Maneuver	493	501	795	487	445	945	1218	-	-	1488	-	-
Stage 1	740	689	-	813	744	-	-	-	-	-	-	-
Stage 2	787	746	-	706	628	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	435	480	795	424	426	945	1218	-	-	1488	-	-
Mov Cap-2 Maneuver	435	480	-	424	426	-	-	-	-	-	-	-
Stage 1	716	683	-	786	719	-	-	-	-	-	-	-
Stage 2	706	721	-	633	622	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	15.2		12.9		2.2		0.2	
HCM LOS	C		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1218	-	-	491	510	1488	-	-
HCM Lane V/C Ratio	0.033	-	-	0.28	0.111	0.008	-	-
HCM Control Delay (s)	8.1	-	-	15.2	12.9	7.4	0	-
HCM Lane LOS	A	-	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	1.1	0.4	0	-	-

Lanes, Volumes, Timings
 7: East Site Access & Witte Rd SE

08/31/2020



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	128	5	3	331	9	3
Future Volume (vph)	128	5	3	331	9	3
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200
Grade (%)	-4%			4%	0%	
Link Speed (mph)	35			35	25	
Link Distance (ft)	426			383	107	
Travel Time (s)	8.3			7.5	2.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	0%	1%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection						
Int Delay, s/veh	0.4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Vol, veh/h	128	5	3	331	9	3
Future Vol, veh/h	128	5	3	331	9	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-4	-	-	4	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	0	0	1	0	0
Mvmt Flow	139	5	3	360	10	3

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	144	0	508 142
Stage 1	-	-	-	-	142 -
Stage 2	-	-	-	-	366 -
Critical Hdwy	-	-	4.1	-	6.4 6.2
Critical Hdwy Stg 1	-	-	-	-	5.4 -
Critical Hdwy Stg 2	-	-	-	-	5.4 -
Follow-up Hdwy	-	-	2.2	-	3.5 3.3
Pot Cap-1 Maneuver	-	-	1451	-	528 911
Stage 1	-	-	-	-	890 -
Stage 2	-	-	-	-	706 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1451	-	526 911
Mov Cap-2 Maneuver	-	-	-	-	526 -
Stage 1	-	-	-	-	890 -
Stage 2	-	-	-	-	704 -

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	11.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	588	-	-	1451	-
HCM Lane V/C Ratio	0.022	-	-	0.002	-
HCM Control Delay (s)	11.3	-	-	7.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Lanes, Volumes, Timings
 8: West Site Access & Witte Rd SE

08/31/2020



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	128	7	3	337	11	5
Future Volume (vph)	128	7	3	337	11	5
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200
Grade (%)	-4%			4%	0%	
Link Speed (mph)	35			35	25	
Link Distance (ft)	135			426	108	
Travel Time (s)	2.6			8.3	2.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	0%	1%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection						
Int Delay, s/veh	0.4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Vol, veh/h	128	7	3	337	11	5
Future Vol, veh/h	128	7	3	337	11	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-4	-	-	4	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	0	0	1	0	0
Mvmt Flow	139	8	3	366	12	5

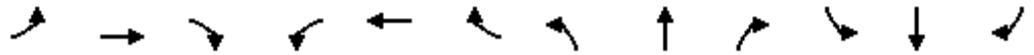
Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	147	0	515
Stage 1	-	-	-	-	143
Stage 2	-	-	-	-	372
Critical Hdwy	-	-	4.1	-	6.4
Critical Hdwy Stg 1	-	-	-	-	5.4
Critical Hdwy Stg 2	-	-	-	-	5.4
Follow-up Hdwy	-	-	2.2	-	3.5
Pot Cap-1 Maneuver	-	-	1447	-	523
Stage 1	-	-	-	-	889
Stage 2	-	-	-	-	702
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1447	-	521
Mov Cap-2 Maneuver	-	-	-	-	521
Stage 1	-	-	-	-	889
Stage 2	-	-	-	-	700

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	11.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	601	-	-	1447	-
HCM Lane V/C Ratio	0.029	-	-	0.002	-
HCM Control Delay (s)	11.2	-	-	7.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Lanes, Volumes, Timings
 9: SE 231st St & North Site Access

08/31/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Volume (vph)	16	0	0	0	0	20	0	95	0	13	136	10
Future Volume (vph)	16	0	0	0	0	20	0	95	0	13	136	10
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Storage Length (ft)	0		0	0		0	50		0	50		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		25			25			35				35
Link Distance (ft)		136			136			460				278
Travel Time (s)		3.7			3.7			9.0				5.4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	3%	0%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

Intersection												
Int Delay, s/veh	1.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	16	0	0	0	0	20	0	95	0	13	136	10
Future Vol, veh/h	16	0	0	0	0	20	0	95	0	13	136	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	50	-	-	50	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0	0	3	0	0	3	0
Mvmt Flow	17	0	0	0	0	22	0	103	0	14	148	11

Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	296	285	154	285	290	103	159	0	0	103	0	0
Stage 1	182	182	-	103	103	-	-	-	-	-	-	-
Stage 2	114	103	-	182	187	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	660	628	897	671	624	957	1433	-	-	1502	-	-
Stage 1	824	753	-	908	814	-	-	-	-	-	-	-
Stage 2	896	814	-	824	749	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	640	622	897	666	618	957	1433	-	-	1502	-	-
Mov Cap-2 Maneuver	676	634	-	692	633	-	-	-	-	-	-	-
Stage 1	824	746	-	908	814	-	-	-	-	-	-	-
Stage 2	876	814	-	816	742	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.5	8.8	0	0.6
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1433	-	-	676	957	1502	-	-
HCM Lane V/C Ratio	-	-	-	0.026	0.023	0.009	-	-
HCM Control Delay (s)	0	-	-	10.5	8.8	7.4	-	-
HCM Lane LOS	A	-	-	B	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.1	0	-	-

Lanes, Volumes, Timings
 10: SE 231st St & Middle Site Access

08/31/2020



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	17	78	0	11	125
Future Volume (vph)	0	17	78	0	11	125
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200
Storage Length (ft)	0	0		0	50	
Storage Lanes	1	0		0	1	
Taper Length (ft)	25				25	
Link Speed (mph)	25		35			35
Link Distance (ft)	110		184			460
Travel Time (s)	3.0		3.6			9.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	3%	0%	0%	3%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

Intersection						
Int Delay, s/veh	1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↔		↔	↔
Traffic Vol, veh/h	0	17	78	0	11	125
Future Vol, veh/h	0	17	78	0	11	125
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	50	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	3	0	0	3
Mvmt Flow	0	18	85	0	12	136

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	245	85	0	0	85	0
Stage 1	85	-	-	-	-	-
Stage 2	160	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	748	980	-	-	1524	-
Stage 1	943	-	-	-	-	-
Stage 2	874	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	742	980	-	-	1524	-
Mov Cap-2 Maneuver	748	-	-	-	-	-
Stage 1	943	-	-	-	-	-
Stage 2	867	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.7	0	0.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	980	1524	-
HCM Lane V/C Ratio	-	-	0.019	0.008	-
HCM Control Delay (s)	-	-	8.7	7.4	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Lanes, Volumes, Timings
 11: SE 231st St & South Site Access

08/31/2020



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	1	0	0	77	124	1
Future Volume (vph)	1	0	0	77	124	1
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200
Storage Length (ft)	0	0	50			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Link Speed (mph)	25			35	35	
Link Distance (ft)	98			178	184	
Travel Time (s)	2.7			3.5	3.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	100%	100%	100%	3%	3%	100%
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔		↔	↑	↑	
Traffic Vol, veh/h	1	0	0	77	124	1
Future Vol, veh/h	1	0	0	77	124	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	50	-	-	-
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	100	100	100	3	3	100
Mvmt Flow	1	0	0	84	135	1

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	220	136	136	0	-	0
Stage 1	136	-	-	-	-	-
Stage 2	84	-	-	-	-	-
Critical Hdwy	7.4	7.2	5.1	-	-	-
Critical Hdwy Stg 1	6.4	-	-	-	-	-
Critical Hdwy Stg 2	6.4	-	-	-	-	-
Follow-up Hdwy	4.4	4.2	3.1	-	-	-
Pot Cap-1 Maneuver	594	706	1015	-	-	-
Stage 1	697	-	-	-	-	-
Stage 2	741	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	594	706	1015	-	-	-
Mov Cap-2 Maneuver	597	-	-	-	-	-
Stage 1	697	-	-	-	-	-
Stage 2	741	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1015	-	597	-	-
HCM Lane V/C Ratio	-	-	0.002	-	-
HCM Control Delay (s)	0	-	11	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Lanes, Volumes, Timings
3: SR 169 & SE Witte Rd/Witte Rd SE

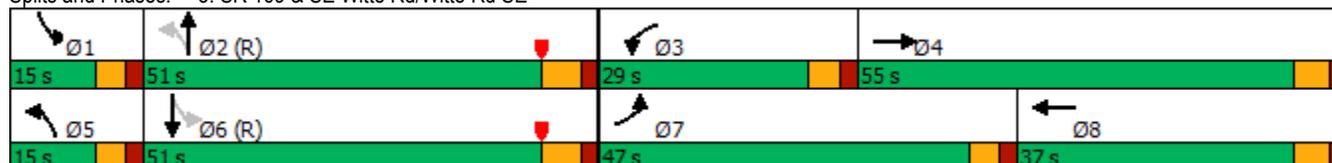
08/31/2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	885	33	8	8	9	0	5	1181	32	10	563	266
Future Volume (vph)	885	33	8	8	9	0	5	1181	32	10	563	266
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Grade (%)		0%			-8%			-6%			4%	
Storage Length (ft)	130		0	180		0	300		200	150		0
Storage Lanes	2		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		971			378			1789			444	
Travel Time (s)		18.9			7.4			34.9			8.6	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	1%	1%	1%	9%	9%	9%	5%	5%	5%	9%	9%	9%
Shared Lane Traffic (%)												
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	10.5	34.0		10.5	37.0		10.5	33.3		10.5	36.3	
Total Split (s)	47.0	55.0		29.0	37.0		15.0	51.0		15.0	51.0	
Total Split (%)	31.3%	36.7%		19.3%	24.7%		10.0%	34.0%		10.0%	34.0%	
Yellow Time (s)	3.5	4.0		3.5	4.0		3.5	4.3		3.5	4.3	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	6.0		5.5	6.0		5.5	6.3		5.5	6.3	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?	Yes	Yes										
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 45 (30%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow
 Natural Cycle: 125
 Control Type: Actuated-Coordinated

Splits and Phases: 3: SR 169 & SE Witte Rd/Witte Rd SE



HCM 6th Signalized Intersection Summary
 3: SR 169 & SE Witte Rd/Witte Rd SE

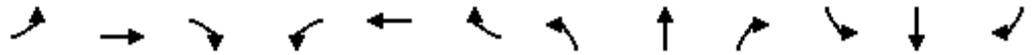
08/31/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	885	33	8	8	9	0	5	1181	32	10	563	266
Future Volume (veh/h)	885	33	8	8	9	0	5	1181	32	10	563	266
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2183	2183	2183	2408	2408	2408	2386	2386	2386	1936	1936	1936
Adj Flow Rate, veh/h	912	34	8	8	9	0	5	1218	33	10	580	274
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	1	1	1	9	9	9	5	5	5	9	9	9
Cap, veh/h	1007	520	122	22	155	0	329	2341	63	204	1270	599
Arrive On Green	0.25	0.30	0.30	0.01	0.06	0.00	0.01	0.52	0.52	0.01	0.52	0.52
Sat Flow, veh/h	4033	1707	402	2293	2408	0	2273	4509	122	1844	2421	1143
Grp Volume(v), veh/h	912	0	42	8	9	0	5	612	639	10	440	414
Grp Sat Flow(s),veh/h/ln	2017	0	2108	2293	2408	0	2273	2267	2364	1844	1840	1724
Q Serve(g_s), s	32.9	0.0	2.1	0.5	0.5	0.0	0.2	26.7	26.7	0.4	22.5	22.5
Cycle Q Clear(g_c), s	32.9	0.0	2.1	0.5	0.5	0.0	0.2	26.7	26.7	0.4	22.5	22.5
Prop In Lane	1.00		0.19	1.00		0.00	1.00		0.05	1.00		0.66
Lane Grp Cap(c), veh/h	1007	0	642	22	155	0	329	1177	1227	204	965	904
V/C Ratio(X)	0.91	0.00	0.07	0.37	0.06	0.00	0.02	0.52	0.52	0.05	0.46	0.46
Avail Cap(c_a), veh/h	1116	0	689	359	498	0	458	1177	1227	300	965	904
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.5	0.0	37.0	73.8	65.9	0.0	18.5	23.7	23.7	19.0	22.3	22.3
Incr Delay (d2), s/veh	9.9	0.0	0.0	7.6	0.2	0.0	0.0	1.6	1.6	0.1	1.6	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	18.0	0.0	1.1	0.4	0.3	0.0	0.1	14.7	15.4	0.2	10.1	9.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	64.4	0.0	37.1	81.4	66.1	0.0	18.5	25.4	25.3	19.2	23.9	24.0
LnGrp LOS	E	A	D	F	E	A	B	C	C	B	C	C
Approach Vol, veh/h		954			17			1256			864	
Approach Delay, s/veh		63.2			73.3			25.3			23.9	
Approach LOS		E			E			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.2	84.2	6.9	51.7	6.4	85.0	43.0	15.6				
Change Period (Y+Rc), s	5.5	6.3	5.5	6.0	5.5	6.3	5.5	6.0				
Max Green Setting (Gmax), s	9.5	44.7	23.5	49.0	9.5	44.7	41.5	31.0				
Max Q Clear Time (g_c+I1), s	2.4	28.7	2.5	4.1	2.2	24.5	34.9	2.5				
Green Ext Time (p_c), s	0.0	9.9	0.0	0.1	0.0	7.7	2.6	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			36.9									
HCM 6th LOS			D									

Lanes, Volumes, Timings
1: SR 169 & SE 231st St

08/31/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	135	328	699	28	124	64	580	503	17	178	1103	150
Future Volume (vph)	135	328	699	28	124	64	580	503	17	178	1103	150
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Storage Length (ft)	250		0	0		170	300		0	150		150
Storage Lanes	1		2	1		1	2		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		693			553			655			674	
Travel Time (s)		13.5			10.8			12.8			13.1	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA	pm+ov	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases			4									6
Detector Phase	7	4	4 5	3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	10.0	34.6	10.0	10.0	36.6		10.0	33.0		10.0	33.0	33.0
Total Split (s)	21.0	46.6	34.0	11.0	36.6		34.0	66.4		26.0	58.4	58.4
Total Split (%)	14.0%	31.1%	22.7%	7.3%	24.4%		22.7%	44.3%		17.3%	38.9%	38.9%
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	4.0		3.6	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	4.6	4.6	4.6		4.6	5.0		4.6	5.0	5.0
Lead/Lag	Lag	Lead	Lead	Lag	Lead		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	C-Min

Intersection Summary

Area Type: Other

Cycle Length: 150

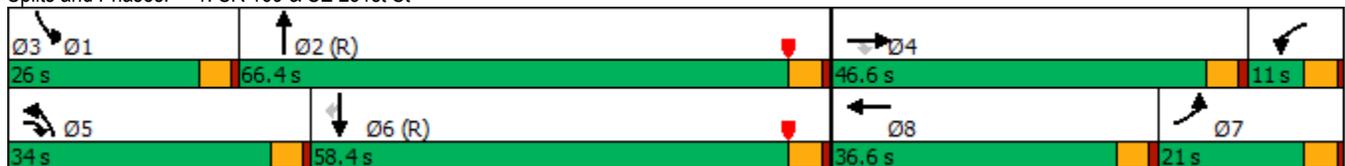
Actuated Cycle Length: 150

Offset: 4 (3%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow

Natural Cycle: 100

Control Type: Actuated-Coordinated

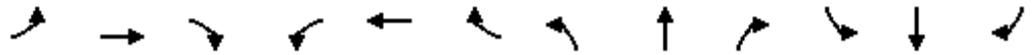
Splits and Phases: 1: SR 169 & SE 231st St



HCM 6th Signalized Intersection Summary

1: SR 169 & SE 231st St

08/31/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	135	328	699	28	124	64	580	503	17	178	1103	150
Future Volume (veh/h)	135	328	699	28	124	64	580	503	17	178	1103	150
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2166	2166	2166	2131	2131	2131	2166	2166	2166	2183	2183	2183
Adj Flow Rate, veh/h	147	357	714	30	135	70	630	547	18	193	1199	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	4	4	4	2	2	2	1	1	1
Cap, veh/h	212	467	1257	48	180	93	705	2145	71	224	1905	847
Arrive On Green	0.10	0.22	0.22	0.02	0.14	0.14	0.29	0.88	0.88	0.11	0.46	0.46
Sat Flow, veh/h	2063	2166	3193	2030	1317	683	4001	4065	134	2079	4147	1844
Grp Volume(v), veh/h	147	357	714	30	0	205	630	277	288	193	1199	3
Grp Sat Flow(s),veh/h/ln	2063	2166	1596	2030	0	2000	2001	2057	2141	2079	2074	1844
Q Serve(g_s), s	10.3	23.2	21.3	2.2	0.0	14.8	22.6	3.1	3.1	13.7	33.0	0.1
Cycle Q Clear(g_c), s	10.3	23.2	21.3	2.2	0.0	14.8	22.6	3.1	3.1	13.7	33.0	0.1
Prop In Lane	1.00		1.00	1.00		0.34	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	212	467	1257	48	0	273	705	1086	1130	224	1905	847
V/C Ratio(X)	0.69	0.77	0.57	0.62	0.00	0.75	0.89	0.25	0.26	0.86	0.63	0.00
Avail Cap(c_a), veh/h	226	606	1463	87	0	427	784	1086	1130	297	1905	847
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	0.00	1.00	0.93	0.93	0.93	1.00	1.00	1.00
Uniform Delay (d), s/veh	65.0	55.3	23.7	72.5	0.0	62.3	51.6	4.4	4.4	65.8	30.8	10.5
Incr Delay (d2), s/veh	9.4	5.2	0.6	17.1	0.0	5.8	11.7	0.5	0.5	19.7	1.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.0	13.3	8.1	1.4	0.0	8.0	11.5	1.3	1.4	8.5	16.8	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	74.4	60.4	24.3	89.7	0.0	68.1	63.3	4.9	4.9	85.6	32.4	10.5
LnGrp LOS	E	E	C	F	A	E	E	A	A	F	C	B
Approach Vol, veh/h		1218			235			1195			1395	
Approach Delay, s/veh		40.9			70.9			35.7			39.7	
Approach LOS		D			E			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	20.7	84.2	8.2	36.9	31.0	73.9	20.0	25.1				
Change Period (Y+Rc), s	4.6	5.0	4.6	4.6	4.6	5.0	4.6	4.6				
Max Green Setting (Gmax), s	21.4	61.4	6.4	42.0	29.4	53.4	16.4	32.0				
Max Q Clear Time (g_c+I1), s	15.7	5.1	4.2	25.2	24.6	35.0	12.3	16.8				
Green Ext Time (p_c), s	0.5	3.8	0.0	7.1	1.8	8.6	0.2	1.0				
Intersection Summary												
HCM 6th Ctrl Delay			40.7									
HCM 6th LOS			D									

Lanes, Volumes, Timings

2: SE Wax Rd & SR 169

08/31/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	123	20	446	40	25	45	297	942	25	45	1737	134
Future Volume (vph)	123	20	446	40	25	45	297	942	25	45	1737	134
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Storage Length (ft)	150		68	250		0	0		0	150		150
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			25			35			35	
Link Distance (ft)		755			389			480			655	
Travel Time (s)		14.7			10.6			9.4			12.8	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Detector Phase	4	4	4	8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		10.0	10.0		10.0	25.0	25.0
Minimum Split (s)	32.6	32.6	32.6	34.6	34.6		14.6	32.0		14.6	30.0	30.0
Total Split (s)	35.0	35.0	35.0	35.0	35.0		34.0	100.4		14.6	81.0	81.0
Total Split (%)	23.3%	23.3%	23.3%	23.3%	23.3%		22.7%	66.9%		9.7%	54.0%	54.0%
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	4.0		3.6	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	4.6	4.6	4.6		4.6	5.0		4.6	5.0	5.0
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	C-Min

Intersection Summary

Area Type: Other

Cycle Length: 150

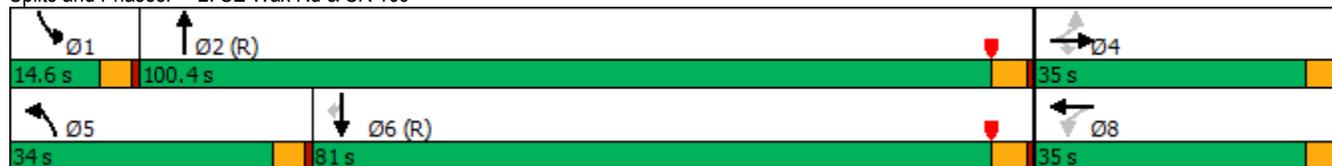
Actuated Cycle Length: 150

Offset: 12 (8%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow

Natural Cycle: 105

Control Type: Actuated-Coordinated

Splits and Phases: 2: SE Wax Rd & SR 169



HCM 6th Signalized Intersection Summary

2: SE Wax Rd & SR 169

08/31/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	123	20	446	40	25	45	297	942	25	45	1737	134
Future Volume (veh/h)	123	20	446	40	25	45	297	942	25	45	1737	134
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	0.99		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2200	2200	2200	2200	2200	2200	2166	2166	2166	2183	2183	2183
Adj Flow Rate, veh/h	132	22	137	43	27	48	319	1013	27	48	1868	144
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	0	0	0	0	0	0	2	2	2	1	1	1
Cap, veh/h	211	342	287	230	110	195	348	2833	76	120	2409	1070
Arrive On Green	0.16	0.16	0.16	0.16	0.16	0.16	0.17	0.69	0.69	0.12	1.00	1.00
Sat Flow, veh/h	1335	2200	1846	1237	706	1254	2063	4094	109	2079	4147	1842
Grp Volume(v), veh/h	132	22	137	43	0	75	319	509	531	48	1868	144
Grp Sat Flow(s),veh/h/ln	1335	2200	1846	1237	0	1960	2063	2057	2146	2079	2074	1842
Q Serve(g_s), s	14.4	1.3	10.2	4.6	0.0	5.0	22.8	15.2	15.2	3.2	0.0	0.0
Cycle Q Clear(g_c), s	19.5	1.3	10.2	5.9	0.0	5.0	22.8	15.2	15.2	3.2	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.64	1.00		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	211	342	287	230	0	305	348	1424	1485	120	2409	1070
V/C Ratio(X)	0.63	0.06	0.48	0.19	0.00	0.25	0.92	0.36	0.36	0.40	0.78	0.13
Avail Cap(c_a), veh/h	274	446	374	288	0	397	404	1424	1485	139	2409	1070
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.73	0.73	0.73
Uniform Delay (d), s/veh	64.2	54.0	57.8	56.5	0.0	55.6	61.3	9.5	9.5	63.9	0.0	0.0
Incr Delay (d2), s/veh	3.0	0.1	1.2	0.4	0.0	0.4	23.3	0.7	0.7	1.6	1.9	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	0.7	4.9	1.5	0.0	2.6	14.1	6.9	7.1	1.7	0.6	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.2	54.1	59.0	56.9	0.0	56.0	84.5	10.2	10.1	65.5	1.9	0.2
LnGrp LOS	E	D	E	E	A	E	F	B	B	E	A	A
Approach Vol, veh/h		291			118			1359			2060	
Approach Delay, s/veh		62.3			56.3			27.6			3.2	
Approach LOS		E			E			C			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.2	108.8		27.9	29.9	92.1		27.9				
Change Period (Y+Rc), s	4.6	5.0		4.6	4.6	5.0		4.6				
Max Green Setting (Gmax), s	10.0	95.4		30.4	29.4	76.0		30.4				
Max Q Clear Time (g_c+I1), s	5.2	17.2		21.5	24.8	2.0		7.9				
Green Ext Time (p_c), s	0.0	14.1		0.8	0.5	48.2		0.4				
Intersection Summary												
HCM 6th Ctrl Delay			18.0									
HCM 6th LOS			B									

Lanes, Volumes, Timings
 3: SR 169 & SE Witte Rd/Witte Rd SE

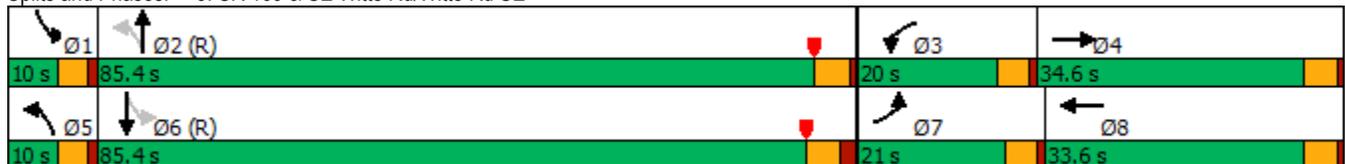
08/31/2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	453	65	18	177	117	16	27	909	47	8	1383	826
Future Volume (vph)	453	65	18	177	117	16	27	909	47	8	1383	826
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Grade (%)		0%			-8%			-6%			4%	
Storage Length (ft)	130		0	180		0	300		200	150		0
Storage Lanes	2		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		971			378			1789			444	
Travel Time (s)		18.9			7.4			34.9			8.6	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	10.0	32.6		10.0	33.6		10.0	33.0		10.0	34.0	
Total Split (s)	21.0	34.6		20.0	33.6		10.0	85.4		10.0	85.4	
Total Split (%)	14.0%	23.1%		13.3%	22.4%		6.7%	56.9%		6.7%	56.9%	
Yellow Time (s)	3.5	3.6		3.5	3.6		3.5	4.0		3.5	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.6		4.5	4.6		4.5	5.0		4.5	6.0	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?	Yes	Yes										
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 33 (22%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow
 Natural Cycle: 150
 Control Type: Actuated-Coordinated

Splits and Phases: 3: SR 169 & SE Witte Rd/Witte Rd SE



HCM 6th Signalized Intersection Summary

3: SR 169 & SE Witte Rd/Witte Rd SE

08/31/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↖		↖	↖		↖	↖↗		↖	↖↗	
Traffic Volume (veh/h)	453	65	18	177	117	16	27	909	47	8	1383	826
Future Volume (veh/h)	453	65	18	177	117	16	27	909	47	8	1383	826
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2200	2200	2200	2547	2547	2547	2456	2456	2456	2074	2074	2074
Adj Flow Rate, veh/h	472	68	19	184	122	17	28	947	49	8	1441	860
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	0	0	0	1	1	1	1	1	1	1	1	1
Cap, veh/h	447	189	53	215	204	28	102	2962	153	373	1585	857
Arrive On Green	0.11	0.11	0.11	0.09	0.09	0.09	0.02	0.66	0.66	0.01	0.64	0.64
Sat Flow, veh/h	4065	1649	461	2426	2182	304	2339	4512	233	1975	2466	1332
Grp Volume(v), veh/h	472	0	87	184	0	139	28	490	506	8	1121	1180
Grp Sat Flow(s),veh/h/ln	2032	0	2110	2426	0	2486	2339	2333	2413	1975	1970	1828
Q Serve(g_s), s	16.5	0.0	5.7	11.2	0.0	8.1	0.6	13.7	13.7	0.2	70.7	96.4
Cycle Q Clear(g_c), s	16.5	0.0	5.7	11.2	0.0	8.1	0.6	13.7	13.7	0.2	70.7	96.4
Prop In Lane	1.00		0.22	1.00		0.12	1.00		0.10	1.00		0.73
Lane Grp Cap(c), veh/h	447	0	242	215	0	232	102	1532	1584	373	1267	1175
V/C Ratio(X)	1.06	0.00	0.36	0.85	0.00	0.60	0.28	0.32	0.32	0.02	0.89	1.00
Avail Cap(c_a), veh/h	447	0	422	251	0	481	134	1532	1584	426	1267	1175
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	0.00	1.00	0.83	0.83	0.83	1.00	1.00	1.00
Uniform Delay (d), s/veh	66.8	0.0	61.3	67.4	0.0	65.3	39.5	11.2	11.2	9.6	22.2	26.8
Incr Delay (d2), s/veh	58.0	0.0	0.9	20.6	0.0	2.5	0.9	0.5	0.4	0.0	9.3	27.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.1	0.0	3.1	8.2	0.0	5.3	0.7	7.1	7.4	0.1	33.9	47.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	124.8	0.0	62.2	88.0	0.0	67.8	40.4	11.7	11.6	9.6	31.5	54.0
LnGrp LOS	F	A	E	F	A	E	D	B	B	A	C	F
Approach Vol, veh/h		559			323			1024			2309	
Approach Delay, s/veh		115.0			79.3			12.4			42.9	
Approach LOS		F			E			B			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	5.9	104.5	17.8	21.8	7.9	102.4	21.0	18.6				
Change Period (Y+Rc), s	4.5	* 6	4.5	4.6	4.5	6.0	4.5	4.6				
Max Green Setting (Gmax), s	5.5	* 80	15.5	30.0	5.5	79.4	16.5	29.0				
Max Q Clear Time (g_c+I1), s	2.2	15.7	13.2	7.7	2.6	98.4	18.5	10.1				
Green Ext Time (p_c), s	0.0	13.0	0.1	0.2	0.0	0.0	0.0	0.4				

Intersection Summary

HCM 6th Ctrl Delay	47.9
HCM 6th LOS	D

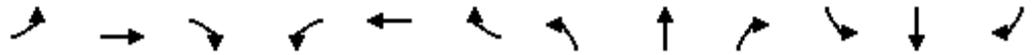
Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings

4: SR 169 & SE 240th St

08/31/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	66	97	159	258	98	80	115	850	157	101	1386	45
Future Volume (vph)	66	97	159	258	98	80	115	850	157	101	1386	45
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Storage Length (ft)	0		180	200		0	300		130	380		150
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		345			804			1369			1789	
Travel Time (s)		7.8			18.3			26.7			34.9	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA										
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	10.0	29.5		10.0	30.5		10.0	29.5		10.0	29.0	
Total Split (s)	15.0	32.0		29.0	46.0		18.0	71.0		18.0	71.0	
Total Split (%)	10.0%	21.3%		19.3%	30.7%		12.0%	47.3%		12.0%	47.3%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	4.5		3.5	4.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	5.5		4.5	5.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes										
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	

Intersection Summary

Area Type: Other

Cycle Length: 150

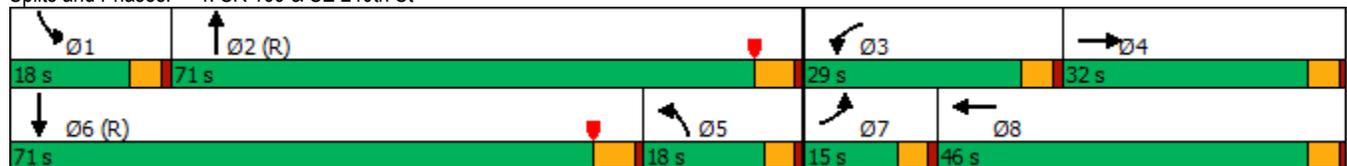
Actuated Cycle Length: 150

Offset: 93 (62%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow

Natural Cycle: 100

Control Type: Actuated-Coordinated

Splits and Phases: 4: SR 169 & SE 240th St



HCM 6th Signalized Intersection Summary

4: SR 169 & SE 240th St

08/31/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	66	97	159	258	98	80	115	850	157	101	1386	45
Future Volume (veh/h)	66	97	159	258	98	80	115	850	157	101	1386	45
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2200	2200	2200	2183	2183	2183	2183	2183	2183	2183	2183	2183
Adj Flow Rate, veh/h	70	103	169	274	104	85	122	904	167	107	1474	48
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	0	0	0	1	1	1	1	1	1	1	1	1
Cap, veh/h	93	115	189	302	284	232	301	1776	328	134	1729	56
Arrive On Green	0.04	0.16	0.16	0.15	0.26	0.26	0.14	0.51	0.51	0.02	0.14	0.14
Sat Flow, veh/h	2095	744	1222	2079	1108	906	2079	3492	645	2079	4098	133
Grp Volume(v), veh/h	70	0	272	274	0	189	122	537	534	107	744	778
Grp Sat Flow(s),veh/h/ln	2095	0	1966	2079	0	2014	2079	2074	2063	2079	2074	2158
Q Serve(g_s), s	5.0	0.0	20.3	19.5	0.0	11.6	8.0	25.7	25.8	7.7	52.6	52.8
Cycle Q Clear(g_c), s	5.0	0.0	20.3	19.5	0.0	11.6	8.0	25.7	25.8	7.7	52.6	52.8
Prop In Lane	1.00		0.62	1.00		0.45	1.00		0.31	1.00		0.06
Lane Grp Cap(c), veh/h	93	0	305	302	0	516	301	1055	1049	134	875	910
V/C Ratio(X)	0.76	0.00	0.89	0.91	0.00	0.37	0.41	0.51	0.51	0.80	0.85	0.85
Avail Cap(c_a), veh/h	147	0	360	340	0	557	301	1055	1049	187	906	942
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(l)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.25	0.25	0.25
Uniform Delay (d), s/veh	70.9	0.0	62.1	63.1	0.0	45.8	58.3	24.4	24.4	72.4	60.0	60.1
Incr Delay (d2), s/veh	11.8	0.0	21.0	25.4	0.0	0.4	0.9	1.8	1.8	4.2	2.8	2.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	0.0	12.0	12.5	0.0	5.9	4.3	13.1	13.0	4.4	30.1	31.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	82.7	0.0	83.1	88.5	0.0	46.2	59.2	26.2	26.2	76.6	62.8	62.8
LnGrp LOS	F	A	F	F	A	D	E	C	C	E	E	E
Approach Vol, veh/h		342			463			1193			1629	
Approach Delay, s/veh		83.0			71.2			29.6			63.7	
Approach LOS		F			E			C			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.2	81.8	26.3	27.8	27.2	68.8	11.1	42.9				
Change Period (Y+Rc), s	4.5	5.5	4.5	4.5	5.5	* 5.5	4.5	4.5				
Max Green Setting (Gmax), s	13.5	65.5	24.5	27.5	13.5	* 66	10.5	41.5				
Max Q Clear Time (g_c+I1), s	9.7	27.8	21.5	22.3	10.0	54.8	7.0	13.6				
Green Ext Time (p_c), s	0.1	13.1	0.3	0.5	0.1	8.5	0.0	0.7				

Intersection Summary

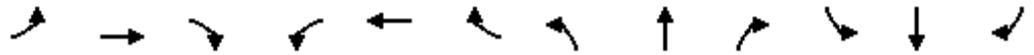
HCM 6th Ctrl Delay	55.3
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings
 5: SE 240th St & SE 228th St

08/31/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	83	14	1	99	14	119	40	18	135	45	151
Future Volume (vph)	90	83	14	1	99	14	119	40	18	135	45	151
Ideal Flow (vphpl)	1900	1900	2200	2200	1900	1900	2200	2200	2200	1900	2200	1900
Storage Length (ft)	150		150	150		150	0		0	150		150
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		30			30			30				30
Link Distance (ft)		804			666			190				1384
Travel Time (s)		18.3			15.1			4.3				31.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)												
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary

Area Type: Other
 Control Type: Roundabout

HCM 6th Roundabout
5: SE 240th St & SE 228th St

08/31/2020

Intersection				
Intersection Delay, s/veh	5.8			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	203	124	192	360
Demand Flow Rate, veh/h	207	126	196	367
Vehicles Circulating, veh/h	201	276	342	243
Vehicles Exiting, veh/h	409	262	66	159
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.9	4.6	5.7	6.9
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	207	126	196	367
Cap Entry Lane, veh/h	1124	1041	974	1077
Entry HV Adj Factor	0.982	0.983	0.980	0.981
Flow Entry, veh/h	203	124	192	360
Cap Entry, veh/h	1103	1023	954	1056
V/C Ratio	0.184	0.121	0.201	0.341
Control Delay, s/veh	4.9	4.6	5.7	6.9
LOS	A	A	A	A
95th %tile Queue, veh	1	0	1	2

Lanes, Volumes, Timings
6: SE 231st St & Witte Rd SE

08/31/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	40	20	0	35	15	10	118	0	10	353	158
Future Volume (vph)	59	40	20	0	35	15	10	118	0	10	353	158
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			0%			9%	
Storage Length (ft)	150		150	150		150	50		0	150		150
Storage Lanes	0		0	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		35			35			35				35
Link Distance (ft)		383			286			278				239
Travel Time (s)		7.5			5.6			5.4				4.7
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	6%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											

HCM 6th TWSC
6: SE 231st St & Witte Rd SE

08/31/2020

Intersection												
Int Delay, s/veh	4.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕			↕	
Traffic Vol, veh/h	59	40	20	0	35	15	10	118	0	10	353	158
Future Vol, veh/h	59	40	20	0	35	15	10	118	0	10	353	158
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	50	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	9	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	1	1	1	2	2	2	6	1	1	1	1	1
Mvmt Flow	67	45	23	0	40	17	11	134	0	11	401	180

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	698	669	491	703	759	134	581	0	0	134	0	0
Stage 1	513	513	-	156	156	-	-	-	-	-	-	-
Stage 2	185	156	-	547	603	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.12	6.52	6.22	4.16	-	-	4.11	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.518	4.018	3.318	2.254	-	-	2.209	-	-
Pot Cap-1 Maneuver	356	380	580	352	336	915	974	-	-	1457	-	-
Stage 1	546	538	-	846	769	-	-	-	-	-	-	-
Stage 2	819	770	-	521	488	-	-	-	-	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	312	372	580	301	329	915	974	-	-	1457	-	-
Mov Cap-2 Maneuver	312	372	-	301	329	-	-	-	-	-	-	-
Stage 1	540	532	-	837	761	-	-	-	-	-	-	-
Stage 2	753	762	-	453	483	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	21		15.3		0.7		0.1	
HCM LOS	C		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	974	-	-	359	407	1457	-	-
HCM Lane V/C Ratio	0.012	-	-	0.377	0.14	0.008	-	-
HCM Control Delay (s)	8.7	-	-	21	15.3	7.5	0	-
HCM Lane LOS	A	-	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.7	0.5	0	-	-

Lanes, Volumes, Timings

7: East Site Access & Witte Rd SE

08/31/2020



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	120	5	3	306	3	9
Future Volume (vph)	120	5	3	306	3	9
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200
Grade (%)	-4%			4%	0%	
Link Speed (mph)	35			35	25	
Link Distance (ft)	426			383	107	
Travel Time (s)	8.3			7.5	2.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	0%	1%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

HCM 6th TWSC
7: East Site Access & Witte Rd SE

08/31/2020

Intersection						
Int Delay, s/veh	0.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	120	5	3	306	3	9
Future Vol, veh/h	120	5	3	306	3	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-4	-	-	4	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	0	0	1	0	0
Mvmt Flow	130	5	3	333	3	10

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	135	0	472
Stage 1	-	-	-	-	133
Stage 2	-	-	-	-	339
Critical Hdwy	-	-	4.1	-	6.4
Critical Hdwy Stg 1	-	-	-	-	5.4
Critical Hdwy Stg 2	-	-	-	-	5.4
Follow-up Hdwy	-	-	2.2	-	3.5
Pot Cap-1 Maneuver	-	-	1462	-	554
Stage 1	-	-	-	-	898
Stage 2	-	-	-	-	726
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1462	-	552
Mov Cap-2 Maneuver	-	-	-	-	552
Stage 1	-	-	-	-	898
Stage 2	-	-	-	-	724

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	9.6
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	790	-	-	1462	-
HCM Lane V/C Ratio	0.017	-	-	0.002	-
HCM Control Delay (s)	9.6	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Lanes, Volumes, Timings
 8: West Site Access & Witte Rd SE

08/31/2020



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	113	7	3	306	4	12
Future Volume (vph)	113	7	3	306	4	12
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200
Grade (%)	-4%			4%	0%	
Link Speed (mph)	35			35	25	
Link Distance (ft)	135			426	108	
Travel Time (s)	2.6			8.3	2.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	0%	1%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

HCM 6th TWSC
8: West Site Access & Witte Rd SE

08/31/2020

Intersection						
Int Delay, s/veh	0.4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Vol, veh/h	113	7	3	306	4	12
Future Vol, veh/h	113	7	3	306	4	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-4	-	-	4	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	0	0	1	0	0
Mvmt Flow	123	8	3	333	4	13

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	131	0	466
Stage 1	-	-	-	-	127
Stage 2	-	-	-	-	339
Critical Hdwy	-	-	4.1	-	6.4
Critical Hdwy Stg 1	-	-	-	-	5.4
Critical Hdwy Stg 2	-	-	-	-	5.4
Follow-up Hdwy	-	-	2.2	-	3.5
Pot Cap-1 Maneuver	-	-	1467	-	559
Stage 1	-	-	-	-	904
Stage 2	-	-	-	-	726
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1467	-	557
Mov Cap-2 Maneuver	-	-	-	-	557
Stage 1	-	-	-	-	904
Stage 2	-	-	-	-	724

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	9.6
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	796	-	-	1467	-
HCM Lane V/C Ratio	0.022	-	-	0.002	-
HCM Control Delay (s)	9.6	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Lanes, Volumes, Timings
 9: SE 231st St & North Site Access

08/31/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	0	7	9	0	11	4	108	6	7	360	6
Future Volume (vph)	9	0	7	9	0	11	4	108	6	7	360	6
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Storage Length (ft)	0		0	0		0	50		0	50		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		25			25			35				35
Link Distance (ft)		136			136			460				278
Travel Time (s)		3.7			3.7			9.0				5.4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	3%	0%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											

HCM 6th TWSC
9: SE 231st St & North Site Access

08/31/2020

Intersection												
Int Delay, s/veh	0.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	9	0	7	9	0	11	4	108	6	7	360	6
Future Vol, veh/h	9	0	7	9	0	11	4	108	6	7	360	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	50	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0	0	3	0	0	3	0
Mvmt Flow	10	0	8	10	0	12	4	117	7	8	391	7

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	546	543	395	544	543	121	398	0	0	124	0	0
Stage 1	411	411	-	129	129	-	-	-	-	-	-	-
Stage 2	135	132	-	415	414	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	452	450	659	453	450	936	1172	-	-	1475	-	-
Stage 1	622	598	-	880	793	-	-	-	-	-	-	-
Stage 2	873	791	-	619	597	-	-	-	-	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	443	446	659	445	446	936	1172	-	-	1475	-	-
Mov Cap-2 Maneuver	443	446	-	445	446	-	-	-	-	-	-	-
Stage 1	620	595	-	877	791	-	-	-	-	-	-	-
Stage 2	859	789	-	609	594	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.2	11	0.3	0.1
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1172	-	-	517	625	1475	-	-
HCM Lane V/C Ratio	0.004	-	-	0.034	0.035	0.005	-	-
HCM Control Delay (s)	8.1	-	-	12.2	11	7.5	-	-
HCM Lane LOS	A	-	-	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.1	0	-	-

Lanes, Volumes, Timings
 10: SE 231st St & Middle Site Access

08/31/2020



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	8	9	109	5	6	370
Future Volume (vph)	8	9	109	5	6	370
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200
Storage Length (ft)	0	0		0	50	
Storage Lanes	1	0		0	1	
Taper Length (ft)	25				25	
Link Speed (mph)	30		35			30
Link Distance (ft)	110		184			460
Travel Time (s)	2.5		3.6			10.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	3%	0%	0%	3%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

HCM 6th TWSC
 10: SE 231st St & Middle Site Access

08/31/2020

Intersection						
Int Delay, s/veh	0.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	9	109	5	6	370
Future Vol, veh/h	8	9	109	5	6	370
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	3	0	0	3
Mvmt Flow	9	10	118	5	7	402

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	537	121	0	0	123
Stage 1	121	-	-	-	-
Stage 2	416	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1
Critical Hdwy Stg 1	5.4	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2
Pot Cap-1 Maneuver	508	936	-	-	1477
Stage 1	909	-	-	-	-
Stage 2	670	-	-	-	-
Platoon blocked, %					
Mov Cap-1 Maneuver	505	936	-	-	1477
Mov Cap-2 Maneuver	567	-	-	-	-
Stage 1	909	-	-	-	-
Stage 2	667	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.2	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	717	1477	-
HCM Lane V/C Ratio	-	-	0.026	0.004	-
HCM Control Delay (s)	-	-	10.2	7.4	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Lanes, Volumes, Timings
 11: SE 231st St & South Site Access

08/31/2020



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	1	0	114	377	1
Future Volume (vph)	0	1	0	114	377	1
Ideal Flow (vphpl)	2200	2200	2200	2200	2200	2200
Storage Length (ft)	0	0	50			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Link Speed (mph)	30			35	30	
Link Distance (ft)	98			178	184	
Travel Time (s)	2.2			3.5	4.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	100%	100%	100%	3%	3%	100%
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

HCM 6th TWSC
11: SE 231st St & South Site Access

08/31/2020

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	1	0	114	377	1
Future Vol, veh/h	0	1	0	114	377	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	50	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	100	100	100	3	3	100
Mvmt Flow	0	1	0	124	410	1

Major/Minor	Minor2	Major1	Major2		
Conflicting Flow All	535	411	411	0	-
Stage 1	411	-	-	-	-
Stage 2	124	-	-	-	-
Critical Hdwy	7.4	7.2	5.1	-	-
Critical Hdwy Stg 1	6.4	-	-	-	-
Critical Hdwy Stg 2	6.4	-	-	-	-
Follow-up Hdwy	4.4	4.2	3.1	-	-
Pot Cap-1 Maneuver	371	474	770	-	-
Stage 1	501	-	-	-	-
Stage 2	707	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	371	474	770	-	-
Mov Cap-2 Maneuver	424	-	-	-	-
Stage 1	501	-	-	-	-
Stage 2	707	-	-	-	-

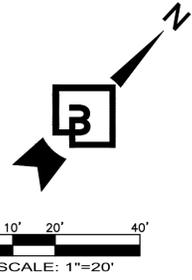
Approach	EB	NB	SB
HCM Control Delay, s	12.6	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	770	-	474	-	-
HCM Lane V/C Ratio	-	-	0.002	-	-
HCM Control Delay (s)	0	-	12.6	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

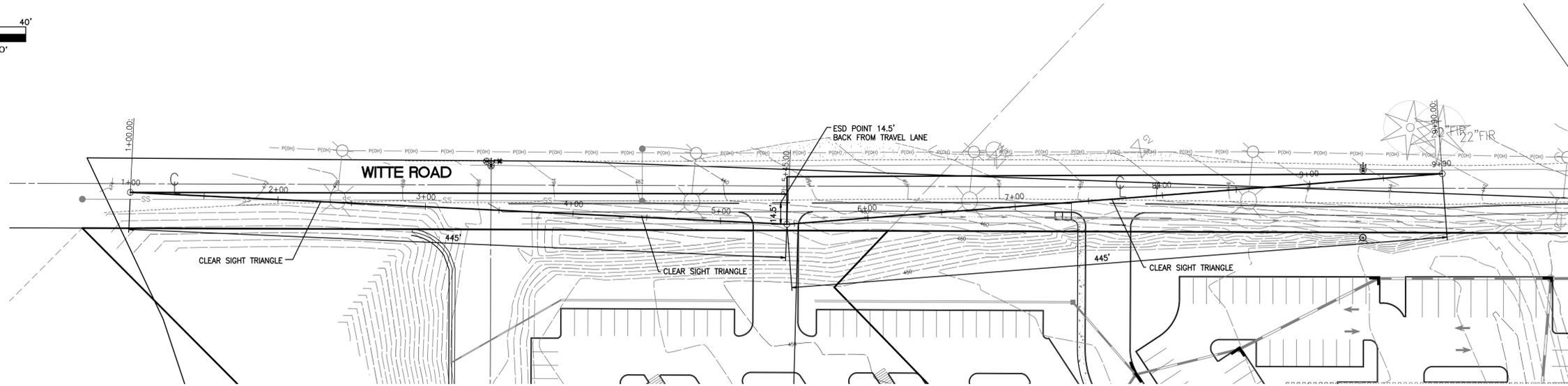
ATTACHMENT D

Sight Distance Exhibits

ENTERING SIGHT DISTANCE EXHIBIT - INTERSECTION OF SOUTH DRIVE AND WITTE ROAD



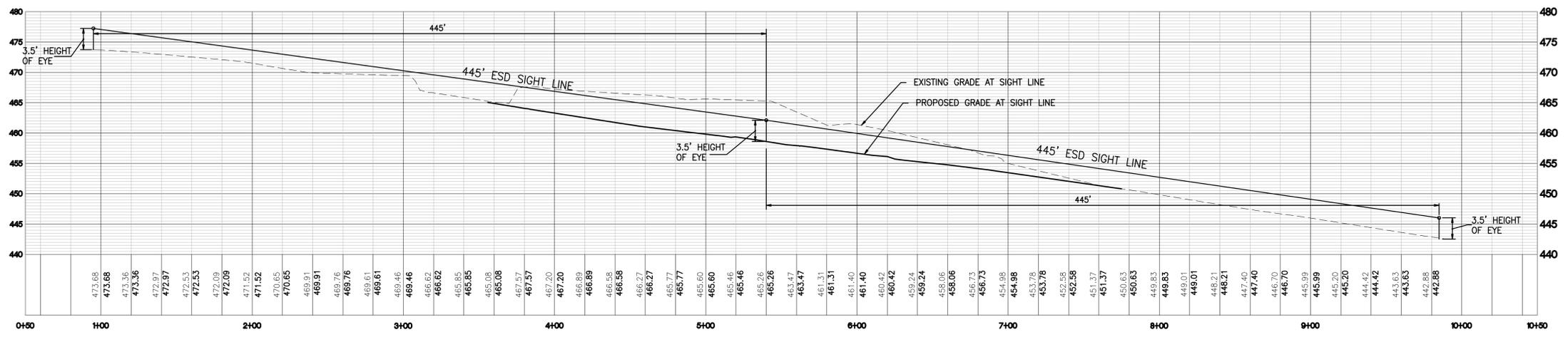
POSTED SPEED = 35 MPH
DESIGN SPEED = 40 MPH



SOUTH DRIVEWAY AT WITTE ROAD

SCALE: 1"=40' VERT/1"=5' HORZ.

PER AASHTO MANUAL TABLE 9-6
 40 MPH DESIGN SPEED
 REQUIRED INTERSECTION SIGHT
 DISTANCE=445'



SOUTH DRIVEWAY AT WITTE ROAD

SCALE: 1"=40' VERT/1"=5' HORZ.

Revision									
No.	Date	By	Chk.	Appr.					

Title:

For:

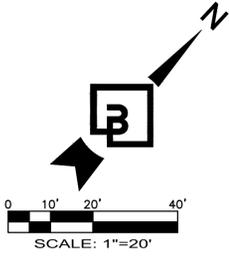
Scale:							
Designed	Drawn	Checked	Approved	Date			

Barghausen Consulting Engineers, Inc.
 18215 72nd Avenue South
 Kent, WA 98032
 425.251.6222 barghausen.com

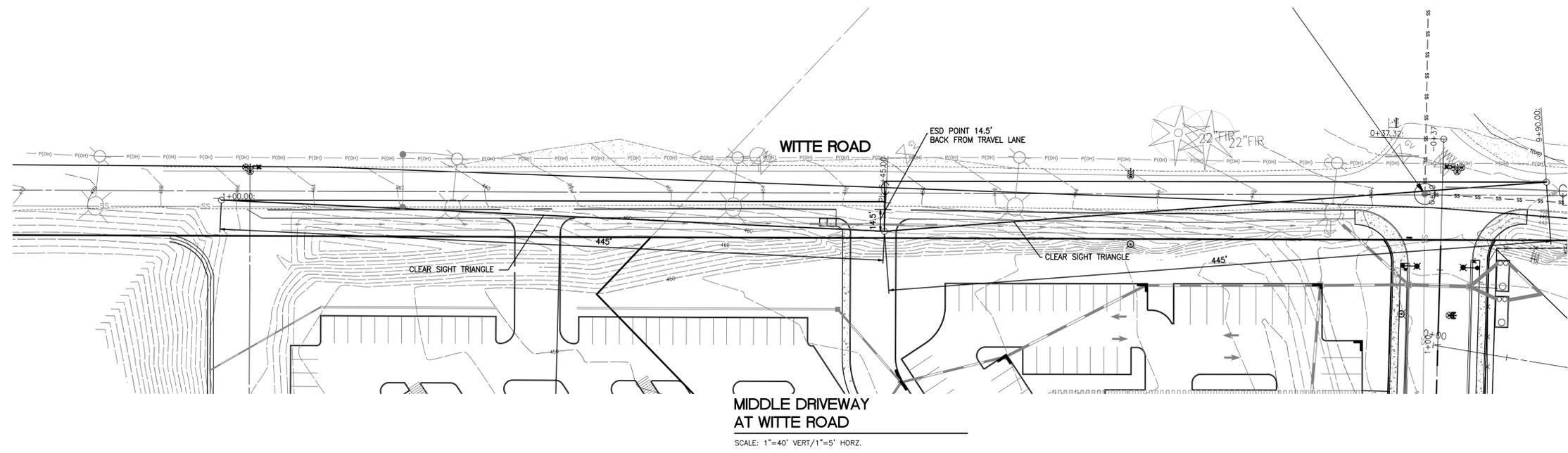


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 Sheet: _____ of _____

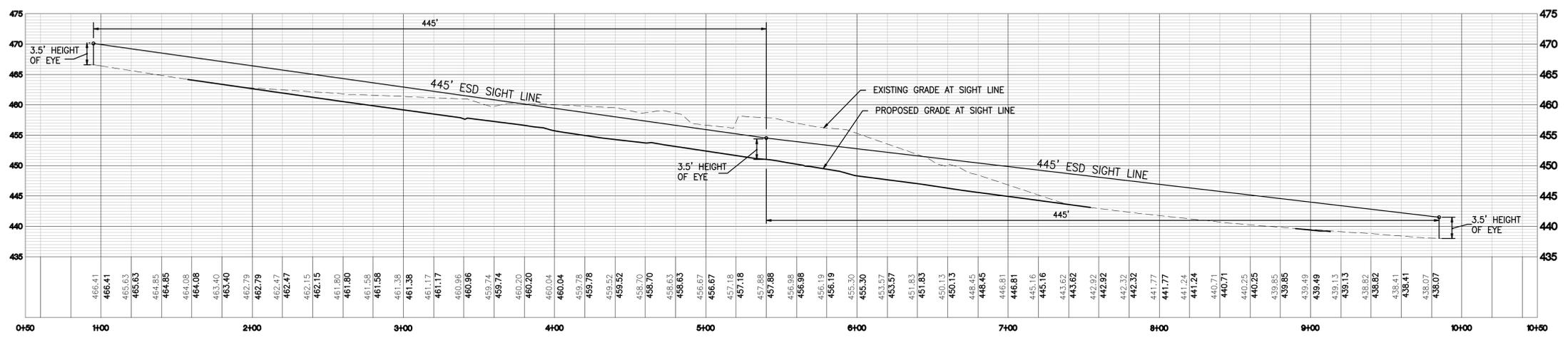
ENTERING SIGHT DISTANCE EXHIBIT - INTERSECTION OF MIDDLE DRIVE AND WITTE ROAD



POSTED SPEED = 35 MPH
DESIGN SPEED = 40 MPH



PER AASHTO MANUAL TABLE 9-6
40 MPH DESIGN SPEED
REQUIRED INTERSECTION SIGHT
DISTANCE=445'



MIDDLE DRIVEWAY
AT WITTE ROAD
SCALE: 1"=40' VERT./1"=5' HORZ.

Revision	
No.	Date
By	Clk.
Appr.	

Title:

For:

Scale:	Horizontal	Vertical
Designed	Drawn	Checked
Approved	Date	

Barghausen Consulting Engineers, Inc.
18215 72nd Avenue South
Kent, WA 98032
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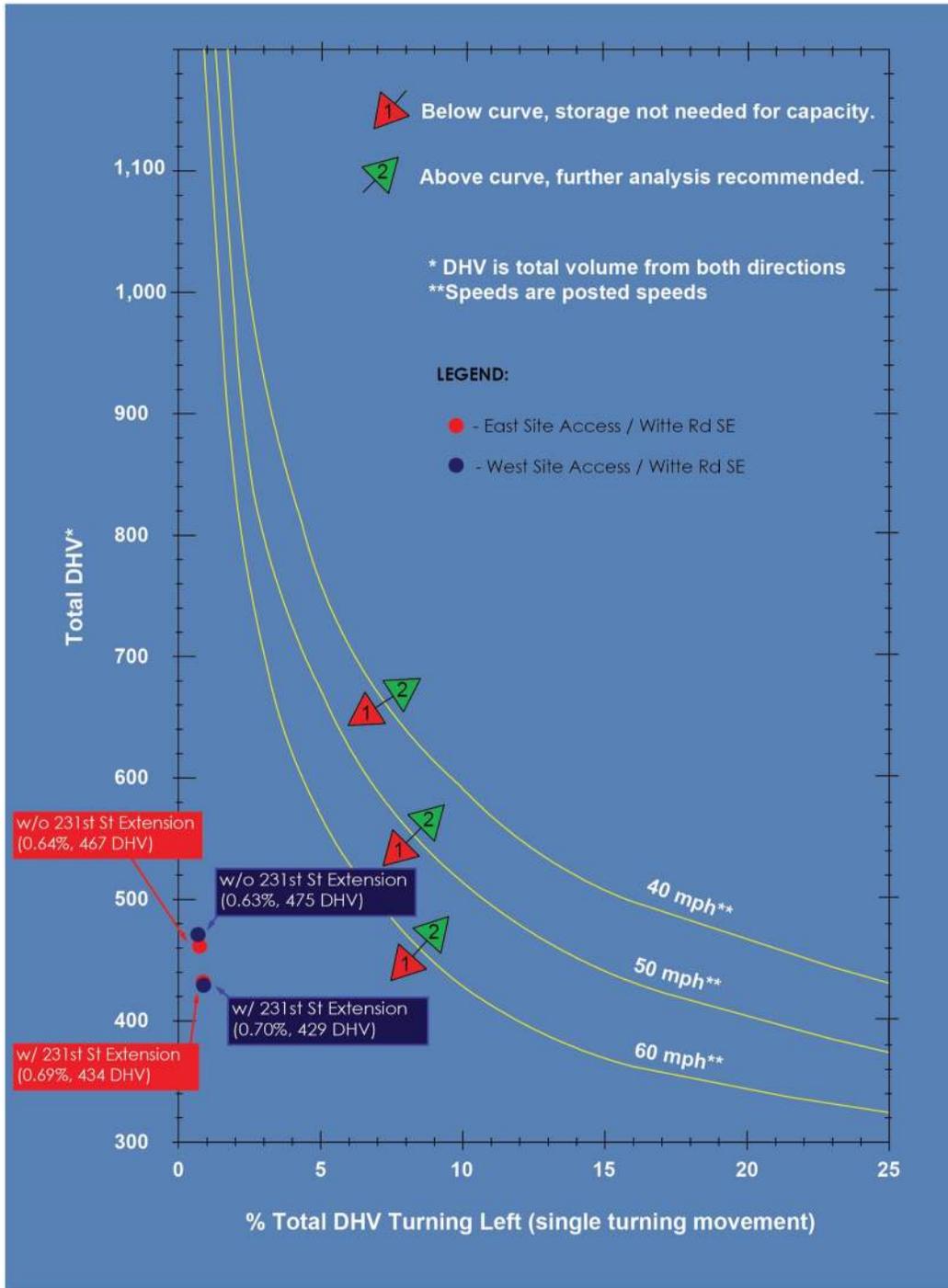


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of: -

ATTACHMENT E

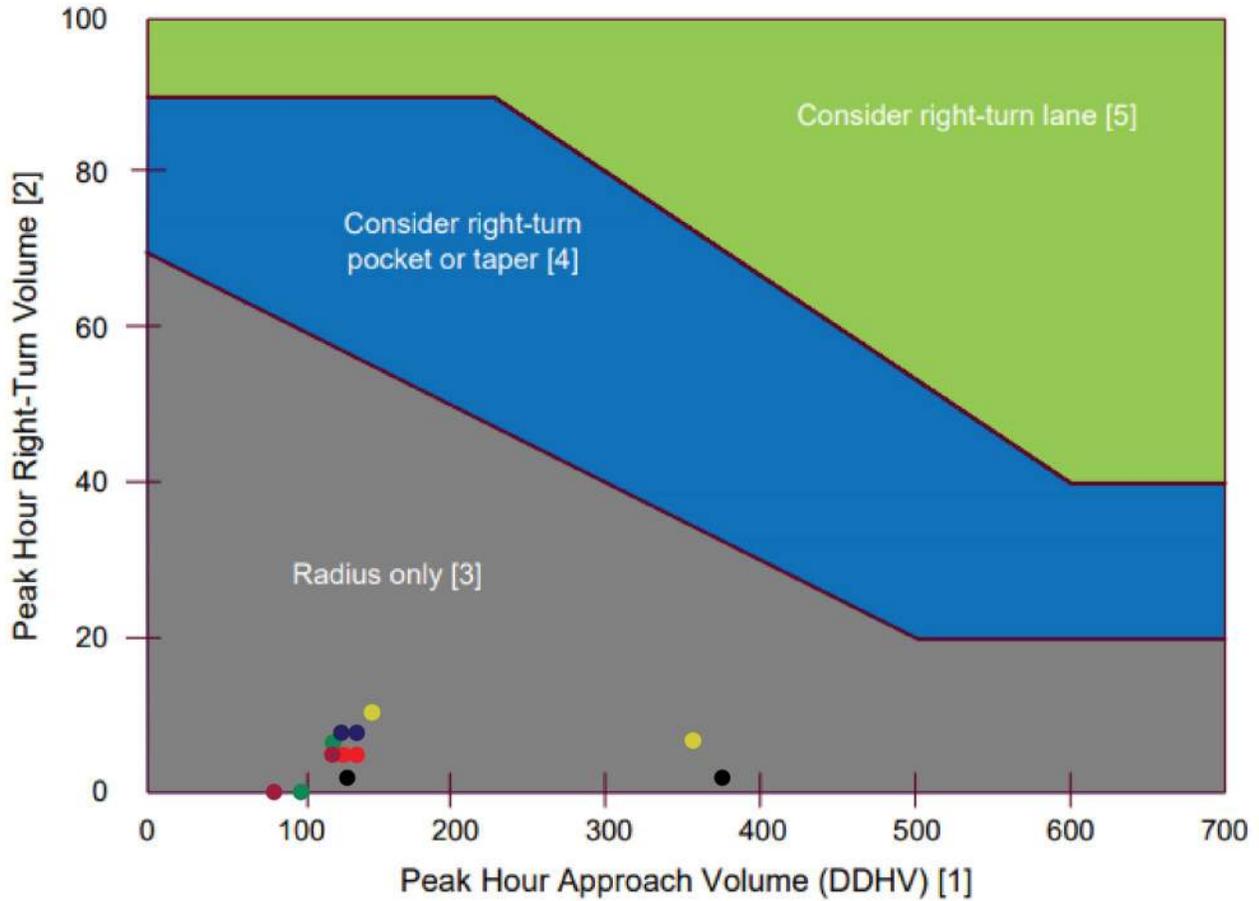
WSDOT Turn Lane Guidelines

Exhibit 1310-7a Left-Turn Storage Guidelines: Two-Lane, Unsignalized



Attachment E-1: WSDOT Left-Turn Storage Guidelines
(East & West Site Access on Witte Rd SE)

Exhibit 1310-11 Right-Turn Lane Guidelines



Symbol	Site Access Driveway	w/o 231st St Extension		w/ 231st St Extension	
		DDHV	Peak Hour RT Volume	DDHV	Peak Hour RT Volume
●	East Site Access / Witte Rd SE	133	5	125	5
●	West Site Access / Witte Rd SE	135	7	120	7
●	SE 231st St/ North Site Access (Southbound)	146	10	366	6
●	SE 231st St/ North Site Access (Northbound)	95	0	114	6
●	SE 231st St/ Middle Site Access	78	0	114	5
●	SE 231st St/ South Site Access	125	1	378	1

Attachment E-2: WSDOT Right-Turn Storage Guidelines (All Site Access Driveways)